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# Collegiate Activities That Influence Adult Physical Fitness Habits

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# COLLEGIATE ACTIVITIES

# THAT INFLUENCE ADULT PHYSICAL FITNESS HABITS

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A Dissertation

Presented to the Faculty of the

Department of Educational Leadership and Policy Analysis

East Tennessee State University

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In Partial Fulfillment

of the Requirements for the Degree

Doctor of Education

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by

Linda L. King

December 1997

APPROVAL

This is to certify that the Graduate Committee of

LINDA L. KING

met on the

Fifth day of November, 1997

The committee read and examined her dissertation, supervised her defense of it in an oral examination, and decided to recommend that her study be submitted to the Graduate Council, in partial fulfillment of the requirements for the degree of Doctorate of Education in Educational Leadership and Policy Analysis.

Chairman, Graduate Committee

Signed on behalf
of the Graduate Council

Interim Dean, School of Graduate Studies

## ABSTRACT

## COLLEGIATE ACTIVITIES THAT INFLUENCE ADULT PHYSICAL FITNESS HABITS

This descriptive/correlational study analyzed the perception of recent graduates regarding the effectiveness of the college environment at Milligan College in influencing adult fitness habits. Graduates were divided into five activity level groups through a self-report of physical activity. The purposes of the research were to determine if significant differences existed between the dependent variable, activity level, and the independent variables such as: (a) participation in specific college activities, (b) preferences for types of exercise, (c) social influence, (d) influence of a required freshman fitness course, and (e) environmental barriers. A profile of the student most likely to exercise after graduation was compiled from the data collected. A formula for activity level prediction was calculated from the data analysis.

Data were collected from 211 graduates of Milligan College. Data analyses were conducted by calculating measures of central tendency, ANOVA, and multiple linear regression. Major findings revealed statistically significant differences between activity level based on male gender, exercise self-efficacy, intensity level, participation in team sports, participation in fitness activities and health beliefs. The four factors that were revealed to be predictors of activity level by multiple linear regression were habit, self-efficacy, high intensity level, and participation in fitness activities while at Milligan.

Recommendations to Milligan College from the study include investing in improved facilities and equipment, implementing more intramural programs at varying ability levels, offering more formal or informal exercise groups on campus, offering more training sessions in use of exercise equipment, and reevaluating the present Fitness for Life course.

## INSTITUTIONAL REVIEW BOARD APPROVAL

This is to certify that the following study has been filed and approved by the Institutional Review Board of East Tennessee State University.

Title of Project: Collegiate Activities that Influence Adult Physical Fitness Habits

Principal Investigator: Linda L. King

Department: Educational Leadership and Policy Analysis

Date Submitted: January 14, 1997

Institutional Review Board, Chair: David V. Wallace MD

# DEDICATION

To my parents, Jack (deceased) and Hazel Williams, who taught and believed that their children could do anything they put their minds to. . .and to my step dad, Mark, for his loving support.

To the myriad of friends who have transported kids, loaned a cabin, bought a lunch, left me alone, kept me company, knew I could do it, cheered, prayed, and planned a party. This would have been so much more difficult without you.

To my children, Kelly and Scott, who agreed in the beginning that this was a good idea and then stuck with me even when they weren't so sure. Thank you for washed dishes, cooked meals, folded laundry, mowed lawns, pulled weeds, quiet times, and patient support. You didn't complain too loudly when I missed volleyball matches, basketball games, half-time shows, parades, or when you were left sitting and waiting for me to finish just one more section. I love you more for what you've helped me do.

And to Roy, who made the end of this dissertation process a whole lot more exciting than the beginning.

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# CHAPTER 1

# INTRODUCTION

A crossroads in public health and fitness occurred in 1996. The first-ever Surgeon General's Report on Physical Activity and Health was released, certifying that regular physical activity is an important component of a healthy lifestyle. The substantial health risks of inactivity were explicitly drawn (Perlmutter, 1996). This report arrived on the tenth anniversary of the first definitive study on exercise and health that clearly linked exercise with longer life. This massive study of Harvard alumni monitored the health of 17,000 men (Paffenbarger, Hyde, Wing, & Hsieh, 1986), and found that for every hour spent exercising, approximately two extra hours of living could be gained. Compared with a sedentary lifestyle, an active lifestyle could result in an additional one to two years of life by age 80.

An analysis of the research literature relating physical inactivity and cardiovascular disease (CVD), which is the leading cause of death in America, concluded that physical inactivity is inversely and causally related to the incidence of CVD (Caspersen, 1987). Besides being linked to CVD, research studies have also linked activity to reduction of cancer (Blair et al., 1986; Friedenreich & Rohan, 1995), diabetes (Helmrich, Ragland, & Paffenbarger, 1994), hypertension (American College of Sports Medicine, 1990) and obesity (Blair, 1993). This evidence concludes that there is less risk in activity than in continuous inactivity. Astrand, a Swedish physiologist stated, "It is more advisable to pass

a careful medical examination if one intends to be sedentary in order to establish whether one's state of health is good enough to stand the inactivity" (Howley & Franks, 1986, p. 82).

In 1991 the United States Department of Health and Human Services published Healthy People 2000, a series of health objectives for the nation. Physical activity designed to promote physical fitness is the first and most prominent priority area listed among the health promotion goals. Specific goals for the nation include both increasing the proportion of people who do regular physical activity for fitness and decreasing the proportion of people who do no leisure-time physical activity.

There is no doubt that physical activity is associated with better health. More research is being done on exercise, physical activity, and physical fitness than at any time past (Blair, 1993). The American College of Sports Medicine (1990) released updated guidelines which allowed improvements in health from lower intensity workouts of longer duration than previously prescribed. Yet, while Americans understand the need to exercise and believe that even moderate exercise would improve their health, 40 to 50% choose to remain inactive. Somewhere in the translation of knowledge to action there is a breakdown.

While research proves that exercise is needed, proving that exercise can be implemented in active patterns of living occurs more slowly. Understanding the knowledge, attitudes, behavior, and social skills associated with adopting and maintaining a regular exercise program is one of the research needs identified in Healthy People 2000 (United States Department of Health and Human Services, Public Health Service, 1991).

Determinants or predictors of physical activity are being discovered as research in this area grows; yet even as specific determinants are revealed, researchers are concluding that different life stages need different intervention strategies. Convincing a 6-year-old to leave Saturday morning cartoons in favor of a swing set is a different problem than convincing an overstressed executive to leave a cluttered desk in favor of a long walk. Studies are needed at distinct stages of life to understand how physical and interpersonal environments might be changed to influence behavior for a lifetime (Dishman, 1982).

With the distinct stages of life come changes in physical activity patterns, the most notable occurring in the transition stage from adolescence to adulthood. This significant decline in physical activity level begins during the high school years and continues through the college years. Because the most significant health benefits come to those who are physically active throughout life, and because the college age population exhibits a significant decline in physical activity levels, any effort that can be made to prevent a decline in activity habits during the college years will impact adult health benefits significantly.

## Statement of the Problem

College is a bridge between active childhood and relatively inactive adulthood. The college physical and interpersonal environment plays an essential role in the development of lifelong exercise habits. Research studying attitudes toward exercise is not sufficient to answer the complex questions of exercise adherence. Investigation of habits and activities that lead to lifelong exercise patterns is also necessary. Researching what specific collegiate activities, curricular and extracurricular, influence adult fitness habits would

provide answers for improvement in the physical activity level of the college age population, and the adult population that directly follows the collegiate years.

## Purposes of the Study

Exercise adherence is a complex activity and is impacted by many subtle forces. This study analyzes the perception of recent graduates regarding the effectiveness of the college environment at Milligan College in influencing adult fitness habits. Graduates have been divided through self-report of physical activity level into five activity groups. The study examines the association of physical activity level with: (a) participation in specific college activities, (b) preference for types of exercise, (c) social influence, (d) influence of a required freshman fitness course, and (e) environmental barriers. A profile of the student most likely to exercise after graduation was compiled from the data collected. The purposes of the data analysis were to determine what college activities are the best predictors of physical activity and to determine if there were tangible changes Milligan College could make to provide more positive encouragement and opportunity for exercise habits that transfer into later adulthood.

## Limitations

1. The validity of the assessment instrument was limited by its nature as a self-report instrument. Reliance on subject ability and desire to provide precise and honest responses is a limitation inherent in the use of self-report information.

2. The population studied was relatively homogenous with respect to socioeconomics, religious preference, and ethnicity.

3. The population consisted of college graduates.

4. Generalizations regarding the findings of this study may not be applicable or appropriate to other institutions or populations

## Definitions

Determinants: a reproducible association or predictive relationship that does not necessarily imply cause-and-effect.

Free-living, lifetime, or moderate activity: many usual activities of daily life done at intensities below 70% of maximal heart rate such as walking, cycling, dancing, gardening, stair climbing, and swimming and performed for 30 minutes per day. These activities lead to improved health benefits.

METS: a measurement of energy expenditure; one MET equals approximately 3.5 ml of oxygen per kg body weight per minute.

Risk factor: a health behavior or personal characteristic that has been linked with a particular disease.

Self-efficacy: a person's belief that he or she can accomplish a task.

Self-report: subject reporting his or her activity level for a specific time period without quantifiable objective measures.

Vigorous activity: exercise performed at an intensity level of 70% of maximal heart rate or greater such as jogging, cross-country skiing, cycling, or aerobic dance and performed three or more times per week for more than 20 minutes. These activities lead to improved fitness benefits.

Fitness Activity: health-related exercise such as jogging, walking, or cycling. These activities are distinguished from sports-related activities.

# CHAPTER 2

# SURVEY OF LITERATURE

The study of exercise determinants can be approached from both a theoretical and a practical viewpoint. The first section of this chapter is a review of key social-cognitive theories of human behavior as related specifically to exercise behavior. As each theory is presented, categories of exercise determinants related to that theory will be described and related research will be presented. The second section of this literature review reports specific exercise determinants contained in the broader categories of determinants described through social cognitive theory. The final section of the literature review briefly summarizes those determinants revealed in the first two sections and relates them to the collegiate setting.

## Social Cognitive Theories of Human Behavior

Psychological theories of human behavior, when applied to the study of exercise adherence, allow us consideration of why people choose or avoid things that are good for their health. The lack of a theoretical approach to the study of exercise behavior might explain the poor understanding of maximizing exercise adherence. Dishman (1982) is particularly critical of the lack of a theoretical framework in investigation of physical activity. The study of exercise adherence in reference to a theoretical approach is fairly recent with the first studies conducted in the 1970s. Even in the 1980s few authors related their studies to a theoretical framework (Godin, 1994b).

Theories of social cognition related to exercise adherence assume that certain personal psychological factors are central determinants of physical activity. As these theories are examined, the determinants most closely related with each theory are revealed.

## The Health Belief Model

The earliest health behavior theory is the Health Belief Model (HBM). The HBM was developed in the 1950s by a group of social psychologists working for the public health service and was first applied to screening utilization rates for various diseases. Their efforts tried to explain people's failure to engage in programs designed to prevent or detect disease (Rosenstock, 1990) and later to predict patient compliance with medical regimens. The original theory is based on four major components: (a) perceived susceptibly to the illness, (b) perceived severity of the illness, (c) perceived benefits of the recommended action, and (d) perceived barriers to the action (Wallston 1994). Another variable tied to this model is "cues" or "triggers to action" (Slenker, Price, Roberts, & Jurs, 1984). These cues are either internal (perceptions or bodily states) or external (interpersonal interaction, media impact, or a tangible such as a postcard from the dentist triggering a visit) (Rosenstock, 1974). According to this theory, if an individual perceives a higher amount of threat, the individual will be more motivated to act. Also, if the individual perceives the benefits to outweigh the costs, the action is more likely to occur.

Additional factors that might make one more or less likely to respond to appropriate health behaviors are demographic variables: age, race, sex, or ethnicity;

sociopsychological variables: personality, social class, or peer pressure; and structural variables: knowledge about a disease or prior contact with a disease (Slenker et al., 1984).

The HBM has not often proven effective in increasing physical activity among sedentary individuals who are not at a particularly high level of health risk. Mullen, Hersey, and Iverson (1987) reported no significant association between the HBM variables and exercise behavior among adults. It seems likely that because the HBM is concerned with perceptions of disease, the healthy population might not choose to change their habits strictly for health reasons.

The HBM effectiveness would likely differ involving a negative addiction (sedentary lifestyle) as compared to creating a positive addiction (active lifestyle). Again, the HBM lends itself better to undoing a negative addiction, or creating behavior change for an existing disease, but only if the person's perception concludes a severe threat. However, this concept currently lacks adequate research evidence.

Although not a part of the original theory, health locus of control has been linked to the study of HBM (Slenker et al., 1984). According to Wallston, Wallston, Kaplan, and Maides (1976), individuals who believe themselves to be in control of health and illness issues through behavior are termed "internal," while individuals who believe they are victims of illness are unable to affect health through personal actions are termed "external."

Slenker et al. (1984) looked at internal locus of control and compared joggers with nonexercisers by using an open-ended elicitation questionnaire based on the HBM. The questionnaire was designed to elicit pertinent beliefs about jogging and was administered

to both groups. Respondents were asked what they perceived as the consequences of not jogging, the benefits of jogging, the barriers to or perceived disadvantages of jogging, and the cues that would make them take up jogging. Ten knowledge items, and the Health Locus of Control Scale developed by Wallston, Wallston, and DeVellis (1978) were also included and the final questionnaire was distributed to 124 joggers and 96 nonexercisers. Through the use of a stepwise multiple regression the variable of perceived susceptibility showed a significant explanatory power in determining jogging behavior, but revealed only a small contribution to producing changes in the sedentary group's behavior. Variables of support, health locus of control, knowledge, and education were found not to be significant predictors of jogging activity. The largest portion of predictable variance (40%) was attributed to perceived barriers such as lack of time, job or family responsibilities, lack of desire or interest, or weather constraints. Overall, this study provided support for the HBM. Sixty one percent of the variance in jogging behavior was accounted for through the tenants of HBM, with 40% coming specifically from perceived barriers to jogging.

These results indicate that individuals with high internal controls would exercise more often. Interestingly, college males who were determined to be more internal in their locus of control, reported more unsupervised free-living physical activity, exhibited more positive attitudes toward physical activity, and were more physically fit (Sonstroem & Walker, 1973).

Dishman and Steinhardt (1990) studied 84 undergraduate students from the University of Georgia enrolled in a health-related concepts and physical activity course. The students were grouped as high active or low active and their health locus of control

was assessed using Form A of the Multidimensional Health Locus of Control Scales (Wallston et al., 1978). This scale allows segmenting control from external, powerful other, or chance sources. Internal controls contributed strongly (beta = .90) to the discriminant function separating active subjects from less active subjects in free-living physical activity, but no correlation existed between internal locus of control and participants in the supervised running program. Perceived barriers were also positively related to activity levels (beta = .32, $p < .01$).

The HBM may not be as effective a model for studying physical activity behaviors as other models that will be discussed. The underlying reason is unclear, but perhaps the HMB is geared more toward those with health problems than the general population. The contributions of perceived barriers to activity and the related topic of locus of control, however, deserve further research.

Social Learning Theory

Knowing that a health behavior might be beneficial and knowing that the task can be successfully completed are two distinctions that separate social learning theory (SLT) from HBM. While the HBM acknowledged the need to believe and understand the possible positive and negative consequences of a health behavior, nothing in the theory discussed a belief that one could successfully perform the desired behavior. Albert Bandura saw a need to incorporate this cognitive mechanism termed self-efficacy within a social learning theory. According to Bandura (1982), the higher the level of self-efficacy, the higher the performance accomplishments and the lower the emotional arousal, both serving to enhance performance. Self-efficacy, as Bandura (1982) explains, is "not a fixed

act or simply a matter of knowing what to do. Rather, it involves a generative capability in which component cognitive, social, and behavioral skills must be organized into integrated courses of action to serve innumerable purposes" (p. 122). What makes this model more appealing related to potential to effect exercise behavior changes than the HBM is the idea that a capability is only as good as its execution. The HBM allows for a knowledge that being sedentary is unhealthy, but that knowledge alone, has not often proven sufficient to determine behavior change. Self-efficacy and SLT take that same knowledge and add to it the perception that "I can exercise". The more positive a person's self-efficacy, the more positive his/her confidence in completing a task.

In defining the social learning theory, self-efficacy is seen to interact with the cognitive prediction of the likely consequences of a behavior (outcome expectations) (Dzewaltowki, 1994). These outcome expectations might include positive or negative physical or social effects as well as internalized incentives (Bandura, 1982). For example, a person might engage in physical activities to improve her health, gain approval from her friends, or experience self-satisfaction; each meeting the definition of an outcome expectation.

The third cognitive process interacting with self-efficacy and outcome expectations in determining physical activity in the SLT is that of personal goals. Goals allow people to raise or lower their efficacy expectations or to create internal satisfaction or dissatisfaction. If an individual believes that exercising 20 minutes four times per week will produce fitness, then four 20 minutes sessions becomes the standard of success or the goal. Self-efficacy depends on this standard. Lowering the goal to three days per week

might raise self-efficacy and hence improve exercise adherence for this individual. When the effects of self-efficacy, outcomes expectations, and goals have been studied together clearly positive results have been shown. In a study by Bandura (1992), the data showed that motivation was increased by over 120% for self-efficacy, outcomes expectations, and goals, compared to approximately a 40% increase when only one optimal cognition was present.

Bandura theorized that self-efficacy is itself determined by past experience, modeling, verbal persuasion, and physiological feedback (Bandura, 1982), hence, both the individual and the environment exert influence in SLT. Modeling, support from family and friends, perceived barriers to exercise, and perceived benefits of exercise influence self-efficacy and hence when coupled with self-efficacy make up possible core variables in the social learning theory. These variables in a group of 24 variables were studied in a large adult community sample to determine their effects on exercise (Sallis et al., 1989). The study involved 2,053 respondents to a random sample mail survey. The purposes of the study were to identify correlates or determinants of vigorous exercise in an adult sample and to compare the effects of these correlates on exercise behavior. Variables were chosen if they had been previously identified as probable determinants of physical activity and if they were theoretically relevant to the study of exercise determinants. A multiple regression analyses of the data revealed self-efficacy to be the most highly correlated variable to vigorous exercise ($r=.48$). Multiple regressions were then conducted without self-efficacy in an effort to learn what variables might precede both self-efficacy and vigorous exercise in a causal chain (Sallis et al., 1989). The most influential barriers were

revealed to be: barriers to exercise, diet, age, modeling, friend support, and home equipment. This study theorizes that if these variables can be improved, self-efficacy and then physical activity can be improved.

Another large study, of 1,411 California adults, was conducted which provided support for the importance of self-efficacy (Sallis et al., 1986). An evaluative survey was administered at the baseline period and again one year later via mail and phone contacts to a randomly selected sample. Initially subjects were grouped as sedentary, moderately active, or vigorously active as a result of the comprehensive health assessment. Changes in status after the one year period were noted. Independent variables included the general categories of health knowledge, activity attitudes, attitudes towards exercise barriers, self-efficacy, and education level. In multivariate analyses, adoption of vigorous activity was predicted by self-efficacy, young age, and male gender. Maintenance of vigorous activity was predicted by attitudes toward the activity (affective). Adoption of moderate activity was predicted by health knowledge, and maintenance was predicted by self-efficacy, female gender, and specific exercise knowledge (necessary for self-efficacy). Perceived self-efficacy predicted change in both vigorous and moderate intensity activity.

Although attitudes about exercise predicted adherence, because these were attitudes toward exercise barriers rather than attitudes toward exercise, attitude seems more related to SLT than to the HBM even though attitude is the key word. If an individual expresses a negative attitude about a barrier to activity, it seems likely to assume strong self-efficacy for the activity can be expressed.

Social learning theory, especially Bandura's theory of self-efficacy is a strong determinant in predicting both exercise adoption and maintenance. Although more evidence relates to SLT than HBM to exercise adherence, more research is needed, especially in an effort to develop the best exercise adherence model. Naming and understanding the specific variables that develop or hinder self-efficacy also deserve further study.

Theories of Reasoned Action

The theory of reasoned action (TRA) was developed by Ajzen and his mentor Fishbein in the 1970s in an effort to explain volitional behavior. According to this theory, intention is seen as the primary determiner of behavior. Intention, according to Fishbein and Ajzen, has two major components: (a) the individual's attitude about performing the behavior and (b) the influence of social factors upon the performance of the behavior (Godin, 1994b).

The attitude component consists of the individual's positive and negative cumulative beliefs about a subject (jogging will help a person lose weight, but take time away from that person's family) and a weighting of the personal evaluation of the consequences (losing weight really is not that important). The social component is also a compound factor consisting of the product of normative belief (expectations of significant others) and motivation to comply (degree of importance an individual places on the significant other's expectations (Wallston, 1994). For instance, a child's mother wants her child to exercise, but if that child does not value the mother's opinion in this area, the social component of intention to exercise will be low. The attitude component is

multiplied by the influence of social factors toward the performance of the act to yield intention. This weighting of attitude and social influence to predict intention takes the concepts of health beliefs from the HBM and gives them more credence. An individual might believe exercise is beneficial, but if that individual has negative attitudes or social influences relating to that belief, intention will be thwarted and so likely will behavior.

The usability of this model assumes the direct relationship of intention and behavior. In a review of 12 published studies, Godin (1994a) reported that the correlation between intention and behavior averaged 0.55, which would yield 30% of the variability as explained by intention, but also found that some exterior variables, especially past behavior or the habit of exercising, had a significant influence on translating intention into behavior. Real or perceived barriers are also thought by some social theorists to have a substantial impact on translating intention into behavior (Ajzen, 1985). So although intention helps determine behavior, other factors seem to interact with that intention to produce behavior which are not specifically addressed by the TRA and need to be investigated further.

Theory of Planned Behavior

Ajzen (1985) took his original TRA and added to it the concept of perceived behavioral control to form the theory of planned behavior (TPB). Ajzen realized that the TRA applied best to behaviors that were under an individual's volitional control. When behaviors are partially or wholly out of the control of the individual, attitudes and social factors might not be enough to determine an intention strong enough to influence a behavior. By adding the concept of perceived behavioral control, similar to Bandura's self-

efficacy, Ajzen improved his earlier model and made allowances for the influence of real or perceived barriers to intention or final behavior. Perceived behavior control allows for personal beliefs related to the ease or difficulty of the behavior and the availability of resources and opportunities.

In a review of eight studies by Godin (1994a) an additional significant proportion of variance in intention to exercise was explained by perceived behavioral control. The additional gain averaged 8%. This increase in predictability of the TPB over the TRA can perhaps be attributed to the consideration of perceived limitations or barriers to exercise in addition to the attitudinal and normative components of the TRA.

One of the studies reviewed by Godin involved 100 female college students attending university intramural aerobic classes (Gatch & Kendzierski, 1990). Analysis of a questionnaire designed to measure attitudes, subjective norms, and perceived behavioral control revealed that both attitude and subjective norms contributed significantly to the prediction of intention, with regression coefficients of 0.30 ($p < .01$) for attitude and 0.25 ($p < .01$) for subjective norm. When perceived behavioral control was entered with attitude and subjective norm, the correlation increased to 0.55 ($p < .001$), thereby significantly increasing the predictability of exercise intentions.

Once an individual decides he or she wants to exercise, he or she must choose and adopt a specific program, then decide whether or not to continue the program. From this perspective, exercise intentions are viewed as important. Although they may not be the sole determinants of exercise behavior, they are at least necessary to the process of determining the behavior. The theory of planned behavior based on the theory of reasoned

action has value in the continued study of exercise determinants but needs further study in particular exercise settings.

Theory of Interpersonal Behavior

The theory of interpersonal behavior (TIP) was developed by Triandis and, like the theory of reasoned action, was not originally intended to explain health behavior (Wallston, 1994). The model put forth by Triandis relates the likelihood of engaging in a particular behavior to three main elements: (a) the habit of performing the behavior, (b) the intention to perform the behavior, and (c) the conditions encouraging the behavior (Triandis, 1977).

The addition of the element of habit distinguishes this model from those previously discussed. Triandis indicates that some actions have become so automatic through habit, that they are begun with little or no conscious intervention. The strength of the habit, determined by the number of times an action has been performed, becomes important to predicting behavior. If an individual has been sedentary all her life (strong habit), no matter how much she might intend to exercise, she will not likely begin a program based on intention alone. The individual who, on the other hand, has been in the habit of exercising regularly, may begin attending an exercise session with little thought or consideration of intention. Triandis indicates that there are two types of activities: (a) the non-automatic activities (early experiences) that are determined by intention, and (b) the habitual experiences (later experiences) that are determined by past behavior patterns or habits (Wallston, 1994). Exercise is not often a fully established habit and so it is unlikely

that people's exercise habits would be fully determined by habit alone, but rather would require an effort of will (Godin, 1994b).

This model defines intention as related to the will and as being shaped by the four component beliefs: (a) cognitive, (b) affective, (c) social, and (d) personal normative (Godin, 1994b). Of these four component beliefs, the affective dimension has proven to be the most influential. Godin (1987) has defined affect, which is the perceived enjoyment related to exercise, as the main attitudinal dimension associated with intentions. If this is the case, exercise programs must offer a positive experience. Moderate exercise programs have been shown to be more enjoyable than strenuously intense programs, which may account for an increase, especially among women, in adoption of these more moderate exercise programs (Wankel, 1984).

The conditions facilitating the behavior serve as the third element in the model, and moderate the influences of both habit and intention. An example of this element might be that of a boy who is trying to lose weight. If his entire family begins a diet and exercise program, his weight reduction program would be facilitated by the conditions provided by his family's action. Conditions facilitating the behavior might be viewed as the opposite of barriers to exercise.

The theory of interpersonal behavior as an exercise model seems to combine the strengths of the Ajzen and Fisbein (1980) model relating to intention with the strength of studies discussing the role of habit on exercise. Although barriers are not specifically addressed in the model, the antithesis of barriers is a part of the facilitating conditions

component of the model. Introduction of habit as a model element makes this theory appealing to the study of exercise determinants and provides incentives for further study.

Comparison of Theories

Additional social-cognitive theories or models can be related to exercise but the models that have been chosen seem to contain all the key elements that are needed in a study of exercise determinants. These five social-cognitive theories often build on or interact with each other. A brief summary of the main thoughts of each theory follows:

1. Health Belief Model: "Exercise would be a good healthy activity in which to participate."

2. Social Learning Theory: "Not only is exercise good to take part in, but it is well within my ability. I can handle this."

3. Theory of Reasoned Action: "I know it's good for me and that's important to me; I like to do this exercise and everyone I value is going to be pleased with me for doing it. I intend to exercise for sure."

4. Theory of Planned Behavior: "I like this exercise, everyone around me likes the fact that I'm exercising, and there is nothing that can keep me from exercising. Not only do I intend to exercise, I am exercising."

5. Theory of Interpersonal Behavior: "I've exercised before and I liked it. Not only can I exercise again, I intend to, and I will."

Summary of Determinants

The goal of this review was to reveal the main potential determinants of exercise behavior. A summary of the major categories of determinants revealed and a listing with the theories that support each, includes: (a) health knowledge (HBM, TRA, TPB); (b) self-efficacy (SLT, TPB, TIB); (c) attitudes (HBM, SLT, TRA, TPB, TIB); (d) past exercise habits (SLT, TIB); (e) perceived barriers (HBM, SLT, TPB, TIB); locus of control (HBM, TPB); and social factors (TRA, TPB, TIB).

The strongest predictors seem to be a combination of self-efficacy, past exercise habits, and enjoyment of the activity or attitude. The remaining determinants influence these three in varying proportions depending on the situation, and all are undergirded by enjoyment.

The next section of this chapter reviews those specific exercise determinants that have been revealed through this study of social-cognitive theories of behavior. Details specific to exercise adherence and intervention are included as pertinent research is presented.

## Determinants of Exercise

### Introduction of the Review

The study of theory gives a framework from which to investigate specific possible determinants of exercise. This section of this survey of literature review synthesizes the findings of research related to determinants of exercise adherence that have been revealed through the study of social-cognitive theories of behavior as presented earlier in this chapter. The goals of this review are to present the scientific literature on known

determinants of exercise and physical activity and to identify those determinants that appear to be the most important based on the findings provided by the studies reviewed. The review method used is best-evidence synthesis, as described by Slavin (1986), which combines meta analysis and narrative review. After locating available research on the topic, study results were summarized in table form and then reviewed in narrative form in the literature synthesis.

## Literature Search Procedures

An extensive search of the literature was conducted to find potentially relevant studies. The principle sources of locating studies included computer and manual searches. Computer searches consisted of searching Education Resources Information Clearninghouse (ERIC) and MedLine. Reference lists from earlier reviews and from the primary studies themselves were manually searched.

## Criterion for Inclusion

Studies were included if they related to any of the determinants named in the theory section of this review and in some way attempted to answer the question, "What determines or helps determine exercise adherence?" Only peer reviewed studies were included. Studies were only included if they made an attempt to note statistical significance or insignificance of the relationship of determinants studied to exercise. General discussion articles were not included. Only determinants identified in more than one study were reported, so while a study might have been included because of its reporting on one determinant, a second determinant may not have been reviewed from that

same study. One summary was included as it mathematically analyzed data from previous studies and performed statistical procedures on those sums to reveal correlations. The studies reviewed consisted of community samples or clinical samples, used a variety of physical activity measures, reflected a range of intensities, and used various statistical procedures.

Interpreting Table 1

Table 1 presents selected studies' characteristics and a simplified tabulation of results. The following list summarizes the information in each column:

Authors. The authors and date of the study are listed. (Complete reference information can be found in the reference list)

Purpose. A brief purpose of each specific study is stated.

Design. Descriptive, comparative, or correlational studies or a combination are designated (no experimental studies were reviewed).

Subjects. The number of subjects and sampling method is related with supplemental information when appropriate.

Instrument (Report method 1,2,3). The specific instrument or instrument type is named. The method of reporting physical activity is listed as (1) self-report method of poor or unknown validity or reliability, (2) self-report method with acceptable reliability/validity or poor objective reliability, or (3) well validated self-report or acceptable objective measure. This method of rating the dependent variable was used by Dishman and Sallis in an earlier review (1992).

Procedures. An evaluation of how the study was conducted and a listing of relevant statistical procedures employed is presented.

Results. A list of the determinants studied including a labeling of the type of influence found is presented. A (+) indicates a determinant showed positive statistical significance, a (-) indicates a statistically significant negative influence and a (0) indicated no statistically significant relationship. No attempt was made to indicate the strength of the relationship.

Generalizability. Strengths and weaknesses of the study are cited as related to the study's potential for translation to other populations

Interpreting Table 2

Table 2 groups studies by determinant and type of influence. Column 1 lists the specific determinant, column 2 lists those related studies presenting positive influence, column 3 lists those studies presenting no influence and column four lists those studies presenting negative influence.

Column 1 also contains a (++), (+), (0), (-), or (--) to indicate the general type of influence ascribed to that determinant based on the evidence reported in columns 2, 3, and 4.

TABLE 1

STUDIES OF EXERCISE DETERMINANTS

| **Authors** | **Andrew, Oldridge, Parker, Cunningham Rechnitzer, Jones, Buck, Kavanaugh, Shephard, & Sutton. 1981** | **Brill, Burkhalter, Kohy, Blair, Goodyear 1989** | **Butcher, J. 1983** | **Cauley, Donfield, Laporte, & Warhaftig 1991** |
|---|---|---|---|---|
| **Purpose:** | Determine Dropout rates CHD patients related to independent variables | examine past athletic status as determinant. of p.a. | examine how personal attributes, socializing agents, and s situations influence girls to p.a. | evaluate the relationship. of socioeconomic status to p.a. levels. |
| **Design:** | Correlational | comparative/corr | Correlational | comparative |
| **Subjects** | 728 CHD patients div. hi lo intensity random | 420 white M age 25-60.<br>-volunteers from prev. health clinic.<br>-no CVD history. | 696 Canadian girls gr. 6-10<br>random cluster | 368 M;549 F;<br>random sample of hi and lo income areas (white) |
| **Instrument (Report Method 1,2,3 lo to hi)** | Questionnaire & phone interview (2) | -Questionnaire<br>-aerobic pts<br>-treadmill, Balke (3) | -Kenyon & McPherson's questionnaire + 6 author items (2) | College Alumni Survey. cal to kcal conversion. (3) |
| **Procedures:** | clear, concise<br>$X^2$, %. 7-year sty | -Questionnaire given to athletes and non and results compared.<br>-Well presented<br>-X, SD, r | -good data collection methods.<br>-int. val good. used r, factor analysis, X2 | -administered survey to 2 distinct SES pop. home visit.<br>-%, Mult.R, *F, p* |
| **Results: Determinants influence +,o,-** | -enjoyment+<br>-convenience+<br>-Perc. of progress +<br>-lifestyle factors+<br>-white collar+<br>-family support+ | -prior athletic. status 0 | self-efficacy +<br>parental influence+<br>hi economic status+<br>attitude to p.a. +<br>age - | -age -<br>-male+<br>-SES for sports+<br>-SES for walking F- |
| **Generalizable** | only CHD male patients but well conducted and in line with other studies | -white M only study. not gen. to women & other ethnicity/<br>-434 athletes, only 75 non-athlete.<br>-only 2 cat. of athletics. | -all female study weakens EV<br>-maj. of s. Catholic, lower economic, care in gen. to total pop.<br>-tables not easily readable | - all white - caution.<br>-good study |

Note: Abbreviations (M=male, F=female, p.a.=physical activity, X=mean, SD=standard deviation, $X^2$=chi square, *r*=correlation, kcal=kilo calorie, rel=reliability, val=validity, s=sample, p=significance).

Table 1 (Continued)

| **Authors** | **Dennison, Straus, Mellitus, & Charney 1988** | **Dishman, RK 1988** | **Dishman, RK & Steinhardt, M 1990** | **Duncan & McAuley 1993** |
|---|---|---|---|---|
| **Purpose:** | examine determinant. of ex. in adults with 5-15 yr. follow-up | examine association of past sports activity and present p.a. | examine internal locus of control as predictor of p.a. | Social support and efficacy in exercise adherence in adults |
| **Design:** | comparative/corr. | correlational | descriptive/ correlational | Correlational |
| **Subjects** | 453 M; 23-25 yrs old | 265 white male. cross-sectional CV health. clinical setting | 84 college students 43=M. 41=F in general studies P.E. course | 85 (41=M, 44=F) in fed. funded X program. stratified s. |
| **Instrument (Report Method 1,2,3 lo to hi)** | 7-day recall interview (3) | -med. and physical activity history. -CV exam -graded X test -ht. and wt. -skin fold. val. and rel. documented (3) | -Exercise Locus of Control scales. good internal consistency cited. -Physical fitness/activity history - 1.5 mi. w/r -questionnaire rel. & val. cited good. (3) | Social Provisions Scale. Self-efficacy survey. Both well validated. (3) |
| **Procedures:** | -subj. took fitness tests while 10-18 yrs. old. -examined p.a. levels 5-15 yrs. later & compared profiles. -$X$,$^2$ SD, $r$ | -Great! adjusted activity level for. in age, fitness, and health status -clinical adm. of measurements. val. and rel. good. 1-way ANOVA used. | -Great also. adjusted for perceived barriers, activity history, fitness levels -Well administered. Included MET and ACSM. -Pearson and descriptive. stats | -ACSM guidelines good. -5 months good. t value, goodness of fit, r, |
| **Results: Determinants influence +,o,-** | -aerobic fit+ -sports after h.s.+ -spouse supp.+ -education+ -prior ath status 0 -high school sport 0 | high school sports participation 0 | internal locus of control 0 -gender 0 | social support 0 self-efficacy + |
| **Generalizable** | -only M studied. caution | all male study. so not to general population. EV -very strong study -good adjustments -a more obj. meas. of sports would help | -white educated subjects so not g. to all levels. EV -very strong study -good adjustments | -limited sample size -hard to determine if support given as requested |

Note: Abbreviations (M=male, F=female, p.a.=physical activity, X=mean, SD=standard deviation, X2=chi square, *r*=correlation, kcal=kilo calorie, rel=reliability, val=validity, s=sample, p=significance).

Table 1 (Continued)

| **Authors** | **Heinzelmann, F. & Bagley, R.W.** 1970 | **Hovell, Sallis, Hofstetter, Spry, Faucher, & Caspersen** 1989 | **Kendzierski, D & DeCarlo, K.J.** 1991 | **Overman, S.J. & Rao, V.V.** 1981 |
|---|---|---|---|---|
| **Purpose:** | examine effectiveness of health programs in changing health attitudes and behaviors | identify correlates of walking for exercise in adults. | Examine reliability and validity of the Physical Activity enjoyment Scale (PACES) | Examine predictors of sports involvement |
| **Design:** | descriptive/ exp. | comparative/ correlational | correlational | correlational |
| **Subjects** | -381 sedentary men aged 45-59<br>-selected from volunteers | -2,053 M & W<br>-random from street directory | -63 students cluster sample in pilot.<br>-44 college students pd $5 in study I<br>-37 stu. given credit | -cluster sample<br>-297 seniors 45%=M 55%=F, 73% white, 27% black |
| **Instrument (Report Method 1,2,3 lo to hi)** | -interviews and questionnaires<br>-no specifics given (1) | -mod. self-report<br>-self-designed quest.<br>-test/retest reported (2) | PACES (2) | -demographic data,<br>-Econ Status Index<br>-Protestant Ethic Sc.<br>-sports questionnaire (2) |
| **Procedures:** | -Procedures section hard to follow<br>-randomly assigned to control /ex. group<br>-just bar graphs and pie charts (25 yr. old research methods) | -well designed and presented.<br>-good tables<br>-%, *r*, *p*,<br>-test/retest | -both studies clear, concise, complete<br>-good ex control<br>-2 x 2 x 2 factorial design used | -clear description with good part. questionnaire.<br>-Pearson r & $R^2$<br>-multiple regression |
| **Results: Determinants influence +,o,-** | -wives influence +<br>-enjoyment +<br>-health benefits + | -age+ (older bet W)<br>-self efficacy +<br>-per. barriers -<br>-family sup +<br>-ex history - | (chose activity enjoyed most after given choice).<br>enjoyment +<br>boredom - | -father's part in sport +<br>-mother's ed. +<br>-gender male +<br>-SES +<br>-birth order + |
| **Generalizable** | -poor EV. unclear sampling procedures<br>-unclear controls<br>-volunteer sample<br>-procedures unclear<br>-more details needed for val & rel | -minorities underrepresented,<br>-only walking<br>-good test/retest for selected var. | -subjects pd IV<br>-subj. got credit weakened EV<br>-more variety in sample would help | -can't gen. to adult populations EV<br>-# of indep. var. was confusing at times. |

Note: Abbreviations (M=male, F=female, p.a.=physical activity, X=mean, SD=standard deviation, $X^2$=chi square, *r*=correlation, kcal=kilo calorie, rel=reliability, val=validity, s=sample, p=significance).

# NOTE TO USERS

**Page(s) not included in the original manuscript are unavailable from the author or university. The manuscript was microfilmed as received.**

**UMI**

Table 1 (Continued)

| **Authors** | **Sallis, Hovell, Hofstetter, Faucher, Elder, Blanchard, Caspersen, Powell, & Christenson 1989** | **Slenker, Price, Roberts & Jurs 1984** | **Stephens, Jacobs, & White 1985** | **Treiber, Baranowski, Braden, Strong, Levy, & Knox. 1991** |
|---|---|---|---|---|
| **Purpose:** | examine several social learning theory variables and rel. to self-reported vigorous exercise | examine rel. between knowledge, attitudes, and ex. beliefs and jogging or not jogging | Review of physical activity pattern surveys | examine social support as determinant. of p.a. |
| **Design:** | correlational | comparative/ correlational | Descriptive/ correlational | comparative/corr |
| **Subjects** | 2,053 M & W<br>-random from street directory | -124 joggers<br>-96 non exercisers<br>-did not state how groups found | 8 national surveys<br>1,139 lowest<br>70,000 highest | -89 M, 141 F teachers;<br>-119 M 119 F community. (Black & white)<br>-random cluster |
| **Instrument (Report Method 1,2,3 lo to hi)** | -modified self report of ex.<br>-Self designed Questionnaire.<br>-good design but val. and rel. not reported (2) | -self report plus<br>-self designed questionnaire<br>-good val supplied, R, mult. R, Eigen. (2) | varied surveys (2) | -Sallis social support scale<br>-Baecke questionnaire (3) |
| **Procedures:** | -clearly presented<br>-used regression & multiple regression w/ & w/o self-efficacy, and % (dem.) | -well designed and explained<br>-a chart would have been helpful with results | -Chose surveys that were detailed, with representative samples<br>- well documented methods | -classed by Hollingshead Social Status Index.<br>-analysis by M/F, white/black<br>-X,SD,*r* |
| **Results: Determinants influence +,o,-** | -self efficacy +<br>-modeling +<br>-family support +<br>-home equip +<br>health benefits +<br>-barriers (lack of interest, enjoyment, discipl, company)-<br>-lack of equip -<br>-age - | -perceived barriers of lack of time,-<br>-responsibilities-<br>-weather-<br>-desire or interest-<br>-knowl. of hlth benefits+<br>-locus of control+<br>-support | -male gender vig.+<br>-Gender lifetime 0<br>-age-<br>-white collar+<br>-blue collar-<br>-distance- | -male +<br>-family/friend sup +<br>-self-efficacy+ |
| **Generalizable** | -min. underrep.<br>-self report limited gen. slightly<br>-only vigorous<br>-strong study | -only related question to Joggers, not general exercise.<br>-second study would be good | -because such large surveys with similar results, good generalizability<br>-variability of instruments and<br>-varied de. of "active" | -good biracial and SES mix.<br>-number rel. small and s. all from PA<br>-first to study racial diff. follow-up study needed |

Note: Abbreviations (M=male, F=female, p.a.=physical activity, X=mean, SD=standard deviation, $X^2$=chi square, *r*=correlation, kcal=kilo calorie, rel=reliability, val=validity, s=sample, p=significance).

Table 1 (Continued)

| **Authors** | **Courney, K.S. & McAuley, E.**<br><br>**1994** | **Anderssen, N., & Wold, B.**<br><br>**1992** |
|---|---|---|
| **Purpose:** | investigate intention and expectation as determinant. of p.a. | examine influence of parental and peer influence of p.a. in adolescents |
| **Design:** | comp/correlational | descriptive/comp/ correlational |
| **Subjects** | -170 undergrads<br>-$ lottery drawing<br>-81=M, 89=F | 904 7th graders<br>498 B, 406 G |
| **Instrument (Report Method 1,2,3 lo to hi)** | -self-report using Borg's PRE to define act. inentsity<br>-questionnaire<br>(2) | self-report w/ val. rel.<br>-from world hlth org. survey<br>-questionnaire<br>(2) |
| **Procedures:** | -stats to compare activity levels with variables intent, habit, expectations<br>-X, SD,, r, | -assoc. and interrel. presented<br>-grouped then Cronbach alpha,<br>-multiple R,<br>ANOVA<br>X,SD,*r*, R2 |
| **Results: Determinants influence +,o,-** | -intention +<br>-habit +<br>-expectations+ | -male gender+<br>-social support + |
| **Generalizable** | -college aged sample<br>-January data - low exercise month | -only surveyed early adolescents. |

Note: Abbreviations (M=male, F=female, p.a.=physical activity, X=mean, SD=standard deviation, $X^2$=chi square, *r*=correlation, kcal=kilo calorie, rel=reliability, val=validity, s=sample, p=significance).

TABLE 2

SUMMARY OF STUDIES BY DETERMINANT AND STRENGTH

| Determinant | Positive influence | No influence | Negative influence |
|---|---|---|---|
| **age** - | Hovell et al., 1989 (walking W only) | Stephens et al., 1985 (lifetime)<br>Sallis et al., 1986 | Overman & Rao, 1981<br>Sallis et al., 1986<br>Stephens et al. 1985<br>Butcher, 1983<br>Cauley et al., 1991<br>Sallis et al., 1989 |
| **male gender** + | Cauley et al., 1991<br>Overman and Rao, 1981<br>Sallis et al., 1986 (vigorous)<br>Stephens et al. 1985 (vigorous)<br>Treiber et al., 1991 (M-sports & work) | Stephens et al., 1985 (lifetime)<br>Dishman, 1990 | Hovell et al., 1989 (walking only) |
| **high economic status** + | Butcher, 1983<br>Cauley et al., 1991 (for W walking) (for sports part.)<br>Andrew et al., 1981 | Overman & Rao, 1981<br>Cauley et al., 1991 | |
| **white collar/ education** + | Andrew et al., 1981<br>Dennison et al., 1988<br>Overman & Rao, 1981 (mother's) | | |
| **distance to facility/ lack of equipment** - | | | Butcher, 1983<br>Andrew et al., 1981<br>Sallis et al., 1990<br>Stephens et al., 1985<br>Sallis et al., 1989 |

Note: The ++ indicates multiple strong studies supporting positive influence, the + indicates a majority of studies supporting a positive influence, 0 indicates mixed or no support, a - indicates a majority of studies supporting negative influence, and the -- indicates multiple strong studies supporting negative influence.

Table 2 (Continued)

| Determinant | Positive influence | No influence | Negative influence |
|---|---|---|---|
| **sports participation** 0 | Dennison et al., 1988 | Brill et al., 1989<br>Dishman, 1988 | |
| **self-efficacy** ++ | Butcher, 1983<br>Duncan, 1993<br>Hovell et al., 1989<br>Reynolds et al., 1990<br>Sallies et al., 1986<br>Sallis et al., 1992<br>Sallis et al., 1989 | | |
| **enjoyment/ attitude** ++ | Kendzierski et al., 1991<br>Butcher, 1983<br>Heinzelmann et al., 1970<br>Sallies et al., 1986<br>Sallis et al., 1989<br>Slenker et al., 1984<br>Andrew et al., 1981 | | |
| **knowledge of health benefits** + | Kendzierski et al., 1991<br>Heinzelmann et al., 1970<br>Sallis et al., 1992<br>Steinhardt et al., 1986 | Slenker et al., 1984 | |
| **high intensity** - | Sallis et al., 1992 (M only) | | Andrew et al., 1981<br>Butcher, 1983<br>Sallis et al., 1992<br>Sallis et al., 1986 |
| **family/friend support** ++ | Andrew et al., 1981<br>Butcher, 1983<br>Dennison et al., 1988<br>Heinzelmann et al. 1970<br>Hovell et al., 1989<br>Overman & Rao 1981<br>Sallis et al., 1992<br>Sallis et al., 1989<br>Treiber et al., 1991 | Duncan et al., 1993 | |

Note: The ++ indicates multiple strong studies supporting positive influence, the + indicates a majority of studies supporting a positive influence, 0 indicates mixed or no support, - indicates a majority of studies supporting negative influence, and the -- indicates multiple strong studies supporting negative influence.

Table 2 (Continued)

| Determinant | Positive influence | No influence | Negative influence |
|---|---|---|---|
| **habit** | Courneya et al., 1994 | | |
| | Dennison et al., 1988 | | |
| ++ | Reynolds et al., 1990 | | |
| | Sallis et al., 1992 | | |
| **intention** | Reynolds et al., 1990 | | |
| | Courneya et al., 1994 | | |
| + | | | |

Note: The ++ indicates multiple strong studies supporting positive influence, the + indicates a majority of studies supporting a positive influence, 0 indicates mixed or no support, - indicates a majority of studies supporting negative influence, and the -- indicates multiple strong studies supporting negative influence.

Literature Narrative

Age, Gender, and Intensity Level. Age, gender, and intensity level can each function as a determinant of exercise. Because these variables are often interrelated they will be reviewed together.

The active proportion of the population declines with age, with the steepest decline coming in late adolescence. At all ages females have been found to be less active than males, but in young adulthood the differences are smaller and not statistically significant. Butcher (1983) documented this decrease in activity levels as fewer hours per week spent in interschool team or free living activities in his study of girls in grades 6-10. Cauley, Donfield, LaPorte, and Warftig (1991) expressed this same decline as a decrease in kilocalorie (kcal) expenditure per week for both men and women, with the sharpest decline experienced in late adolescence and defined age as the primary predictor of expenditure of kcal per week.

In a random sample of 2,053 San Diego adults, Sallis et al. (1989) found that while 46% of men and 45% of women reported vigorous exercise below age 50, only 35% and 32% respectively reported vigorous exercise after age 50. In an earlier study involving a sample of 2,119 adults, Sallis et al. (1986) found this same trend to decreased activity level of vigorous or moderate intensity activity at all age levels except the 65 and over age level. Although the study showed a decline in adoption of vigorous activity with increased age, there was no relationship to age and adoption of moderate activity. Both of these studies relied on self-report measures of activity that were validated to an acceptable degree by cross-sectional associations and test-retest procedures.

Hovell et al. (1989) was the only study to show a positive correlation between age and activity level. This study of 2,050 randomly sampled adults only investigated walking which is a moderate level activity and showed that women and older adults showed significantly greater walking than men and younger adults. Interestingly, this study also showed an inverse relationship between minutes of walking and exercise history. Perhaps this can be explained by the possibility that the ease of a walking program holds appeal for those who have not been active in other more complex exercises earlier in their lives.

Cauley et al. (1991), in their study of 1000 Pennsylvania residents in two different socioeconomic levels, found that male gender was positively correlated with activity level in both socioeconomic levels. Although Treiber et al. (1991) found black and white males to be more active overall than black and white females, the study showed males to be more active in work and sports but females to be more active in leisure time activities. Sallis et al. (1986) found men more likely to adopt vigorous activity than women (11% to 5%), but found women slightly more likely to adopt moderate activity than men (33% to 26%). The Canada Fitness Survey (1983) even indicated young women were more active than young men by ages 18-19, which was a reversal from younger ages and infers that males and females may change their exercise habit rates differently as they age, especially as related to types of activities.

Dishman and Steinhardt (1990) studied 84 college students at the University of Georgia. The Seven Day Recall for total activity was calculated (validity and reliability reported from previous studies for college students). An interesting twist to this study was that when energy expenditures were expressed relative to body weight in kilograms, there

were no gender differences evident. This result suggests that in the college age group, if body size and muscle mass were equalized, the suspected differences in activity level based on gender would not be present. Caution must be observed in translating these finding to other age groups.

Men and younger adults, as has been cited, are more likely to engage in vigorous activities and sports while women are more likely to engage in moderate lifetime activities. Of interest here is the fact that the dropout rate for lifestyle activities is one half that for vigorous activity (Sallis, 1982).

Socioeconomic Status. White collar occupations, educational levels, and socioeconomic status were found to vary together, so will be described together under the heading of socioeconomic status (SES). A majority of studies showed SES as a determinant of exercise. Stephens, Jacobs, and White (1985), in a summary of eight national surveys showed that as SES increased, activity level increased and described this relationship as moderately positive with activity level of the highest income groups exceeding that of the lowest by factors from 1.2 to 2.3. Among low income individuals 18 years of age or older, only 7% were engaged in vigorous activity and 32% reported no activity at all. Lack of money, time, and safe neighborhoods were cited as possible reasons for this lower activity rate. These factors need to be considered when targeting specific populations for exercise intervention.

The Butcher (1983) study of school girls listed the SES as a determinant of activity level. In this study the SES of mother and father were built into a large variable labeled

"socialization influence," which only accounted for 8.3% of the variance; so although SES was listed as significant, the relationship appears to be weak.

One significant study did not link socioeconomic status with activity levels. Although Cauley et al. (1991) found correlation for SES and walking among women and for sports among men, no strong correlation between overall activity levels for males and only a borderline correlation for females were found when age, obesity, smoking, month of visit, and alcohol consumption were considered. The Paffenbarger et al. (1986) survey was used as the self-report method and was considered a reliable significance was determined for SES and any of the named variables, which might have produced an indirect relationship between SES and activity levels.

More studies need to be conducted that allow for the consideration of confounding variables related to SES before a significant relationship can be assigned. Different patterns of activity in relation to SES also need to be studied.

Barriers. Access to facilities and a lack of time were frequently cited as barriers to exercise in studies of specific exercise determinants. Although time cannot be expanded or diminished, proximity to exercise facility or equipment can be viewed as related to the time barrier. Although most studies cited distance to facility as a reason for not beginning or for dropping out of an exercise program, few studies actually investigated the effect of actual distance on participation. A study, conducted in San Diego, California (Sallis et al., 1990), however, did look at distances to exercise facilities from the homes of 2,053 adults. Subjects were located on a grid-map and coded as to exercise level through a self-report. Exercise facilities, both free and pay, were located on the grid-map and the density of

exercise facilities around each respondent's home address was computed. Subjects who engaged in three or more exercise sessions per week reported a statistically greater density of pay facilities near their homes than those who reported no exercise sessions after controlling for age, education, and income. The absence of association between exercise habits and public facilities may be related to the fact that schools constituted 68% of the public facilities but were used by only 5% of the respondents. In the Ontario Exercise Heart Collaborative Study of 728 subjects, Andrew et al. (1981) found the dropout rate to be two times higher for those who perceived their center to be inconveniently located. Similarly, exercise equipment availability was listed as a predictor of total activity by Butcher (1983).

The study of the community sample by Sallis et al. (1989) listed not only a lack of equipment, but also lack of skills and lack of knowledge on how to exercise as barriers correlated with vigorous exercise. This suggests that not only does the equipment need to be accessible to the exerciser, but the exerciser must also be skilled in its use. Home exercise equipment in this study was found to be a significant independent correlate of exercise frequency. This finding seems logical, as having equipment in the home negates the distance to facilities barrier.

Although the barriers presented give plausible reasons to chose to not exercise, it is interesting to note that regular exercisers were as likely as or more likely than the sedentary to view time and distance as barriers. Those who determine to exercise seem to find a way to exercise in spite of the barriers cited. If a barrier is real, it needs to be adjusted through perhaps flexible scheduling or home programs; but, if the barrier is

merely perceived as a barrier, perhaps teaching to change people's perception about barriers would be beneficial.

Sports Participation. Although sports participation through athletics seems at face value to have a relationship to physical activity levels, several significant studies present evidence to the contrary. In a study of 265 Caucasian men (Dishman, 1988a), representing a broad spectrum of cardiovascular health, a cross-sectional analysis of free-living and supervised exercise revealed no significant differences in adult activity levels between former athletes and non athletes. A Seven Day Recall of free-living activity was found to be valid as correlated with concurrent self-report and with body mass index and exercise tolerance adjusted for coronary health status. This study controlled for subject selection bias and confounding variables of age, physical fitness, and health status between the groups of athletes and non-athletes. The lack of association between school sports and adult physical activity held for both free-living and supervised exercise.

Brill, Burkhalter, Kohl, and Blair (1989) conducted a longitudinal study to determine differences between 345 former athletes and 75 non-athletes in adoption rates of exercise programs. The subjects in this study were self-referred to a preventative medicine clinic for fitness evaluations and medical advice. Only participants who did not have a history of chronic cardiovascular disease were included in the study. A questionnaire utilizing an acceptable measure of self-report classified the men into exercisers or non-exercisers. Exercise adoption rates were comparable in the former athletes (82%) and non-athletes (85%). The two groups were found to be similar on physical fitness, health behaviors, and clinical status at baseline which led to the authors'

conclusion that previous athletic experience has little relationship to present health habits. Although the number of subjects in this study was small, especially the non-athletes, the study was well conducted and lends credence to the opinion that former athleticism is not a significant determinant to present exercise adherence.

The Dennison, Straus, Mellits, and Charney (1988) study did show a correlation of athletic performance after high school and present activity levels, but because this was a study conducted on 23-25 year old males, the time differential between sports participation and time of study was short. It is possible that the sport involvement influenced the present activity level more as habit, than as benefits that came with participation in sports.

Studies of participation in organized sports are often focused on parental influence and gender. Interestingly, the parents' past sports accomplishments rather than their sport values were the most important influences on the child's sport involvement (Overman & Rao, 1981). Mother's educational level was influential in the number of sports played outside of school and on school teams.

Sometimes studies of determinants of behavior omit influences that appear obvious. A practical look at the parental influence on children's sports participation level involves issues as uncomplicated as purchasing sports equipment and transporting to and from playing fields and gymnasiums. No matter how intently a young person would like to be involved in a school or non-school program, if parents are not able or not interested in buying shoes, bats, balls, or racquets, or if they are unwilling or unable to transport to and from practice, the child has little chance of being involved in physical activities. Butcher

(1983) related the child's total number of activities (interscholastic, intramural, and community) to the amount of sports equipment available to the child and reported a correlation of $r = 0.37$.

Children whose parents are involved with participation through transporting, supporting, and purchasing equipment tend to be more participatory in activities of various kinds. If children participate in several sports or if they have active parents or parents who participated in sports during their youth, these children are more likely to grow to be active adults, especially young adults. There are more sports programs than activity programs like aerobics or hiking available for children. It seems plausible to generalize the positive effect that sports has on adult activity levels to any activity in which a child might be encouraged to participate. The rationale that being active in any way (forming habits) transfers into activity in the next stage of life holds merit.

Habit. To say that exercise habit is a determinant of exercise adherence seems a logical assumption, but the Sallis, Hovell, and Hofstetter (1992) study states the relationship meaningfully. The 1,719 randomly selected adults in this study were grouped into active, intermediate, and sedentary following the recommended guidelines of the American College of Sports Medicine. When the "months active" were compared over the prior 24 months, the sedentary group mean was 4.6 months, the intermediate group mean was 9 months and the active group was 17.7 months. The data suggest the activity categories reflect meaningfully different exercise habits over the previous 24 months. Sallis et al. (1986) revealed participation in moderate activity as a significant predictor of adoption of vigorous activity In a study primarily investigating the relationship of intention

with physical activity, Courneya and McAuley (1994) found that previous activity or habit was a stronger, more significant predictor of activity than either intention to exercise or expectations as defined by the individual's estimate of the likelihood of actually performing a future exercise. Exercise is rarely a well established habit, so relying on habit alone to determine exercise is often not fruitful, but studying determinants to improve habit is beneficial.

Enjoyment. Another logical determinant of exercise is enjoyment or attitude toward exercise. Heinzelmann and Bagley (1970) studied 381 cardiovascularly-at-risk men, aged 45-59. Analysis of the completed questionnaire showed a significant correlation between enjoyment of the activity and participation in an exercise program. Although the sample in this study was small, the larger study by Sallis et al. (1986) revealed attitude toward activity a significant predictor of adoption and maintenance of vigorous activity in both males and females. The community sample studied by Sallis et al. (1989) also revealed a significant correlation between enjoyment and exercise as it revealed significant correlation between the lack of enjoyment and choosing to not exercise. This was perceived as the greatest barrier to exercise in this well constructed study. By equating a lack of interest with a lack of enjoyment, the Slenker et al. (1984) study involving 124 joggers and 96 non-exercisers cited barriers, chief of which was lack of interest, as the most significant predictor of non-exercise.

Using the Physical Activity Enjoyment Scale (PEAS), Kendzierski and DeCarlo (1991) found that the more bored the subject was with the exercise, the less enjoyment was experienced and the less the subject participated. The study also concluded that

individuals chose to participate in the activity that they most enjoyed. A study of post-coronary patients indicated that enjoyment is an influential factor for continuation in an exercise program as those who were not enthusiastic about a program had higher dropout rates from exercise programs than the more enthusiastic (Andrew et al., 1981).

Social Support. Enjoyment of an activity seems also related to other possible determinants of exercise. Social support found in modeling and family or friend support is a likely partner to enjoyment and has been shown to increase the probability of exercise adherence. Activity modeling and support by mothers serve as strong predictors of later exercise behaviors by daughters (Butcher, 1983). If parents do exercise with their children, they provide positive role models because of their exercise behavior. In a study by Anderssen and Wold (1992) of parental and peer influences on leisure time physical activity, parental exercise was related to overall frequency of exercise in adolescents. The National Children and Youth Fitness Study II (United States Department of Health and Human Services, 1981) found, however, that most parents do not model regular physical activity to their children. Only 42.1% of mothers and 48% of fathers of children in grades 1-4 participated in moderate to vigorous physical activity in a typical week.

The influence of parents wanes through the late teen years. Where parents influence lessens, however, peer influence increases and become the more prominent form of social support; moving from neighborhood influences in childhood, to friends and roommates in school and college, to spouses, to people at the workplace. Peers can exert the social influence to exercise more or less, and can provide models for exercise-related attitudes and behavior. A simple thing like the social support of talking with friends while

exercising lessens boredom and increases enjoyment (Kendzierski & DeCarlo, 1991). Reinforcement from an activity partner has been found to be a potent determinant of adherence to exercise programs. A study of 381 middle-aged sedentary men (Heinzelmann & Bagley, 1970), conducted to examine attitudes and behavior systematically over an 18 month period, revealed that social aspects of exercise and desire to please their wives were considered least important in influencing the participants decisions to exercise at the beginning of the program. At the program's end, however, camaraderie was listed by over 25% of the participants as the best liked feature of the program. Of those responding, 90% indicated that they preferred to exercise with a group or with another person and gave the reason that they enjoyed the exercise more with a partner or group.

Heinzelmann and Bagley (1970) in this same study concluded that although the subjects did not view their decisions to exercise as having been greatly influenced by a desire to please their wife, the wife's attitude or feeling about exercise constituted a significant impact on the husband's adherence to the exercise program over the 18 month period. Eighty percent of the husbands whose wives had positive attitudes toward their exercising showed good or excellent adherence to the program while only 40% of the husbands whose wives had neutral or negative attitudes showed this same adherence. This high dropout rate was confirmed in a study of 639 subjects (Andrew et al., 1981) as three times more participants dropped out of their exercise program if their spouse was indifferent or negative than if the spouse was supportive.

In the study by Hovell et al.(1989) the 1,050 subjects who were randomly selected and responded to a mailed questionnaire that was shown to be valid and reliable through

test-retest indicated family support to be one of the most powerfully related variables to exercise adherence. Although this study dealt only with walking as exercise, the high percentage especially of older women who choose walking as a means of exercise make the finding relevant.

In the expansive study of 2,053 randomly selected adults Sallis et al. (1989) found modeling correlated with vigorous exercise at a strong r=.28 and friend support at r=.27. In the 18-49 age group, modeling was significant at 0.005 although friend support was 0.08. The increasing effect of peer influence can be seen as these numbers changed to 0.16 for modeling and 0.03 for friend support in the 50+ age group.

In the biracial study of lower to middle class male and female teachers (Treiber et al., 1991), white women's and men's overall activity levels, especially sports and leisure activities, were positively correlated with family and friend support. This study used a social support scale developed by Sallis et al. (1989) and although the Sallis group conducted their original study on college Caucasian students, similar results were found in this study, lending concurrent validity to the data. Activity levels were derived from the Baecke scale which had been observed to have adequate internal consistency and test-retest reliability.

Knowledge of and Belief in Health Benefits. Although enjoyment and feelings of well being seem to be stronger motives for continued participation in physical activities, knowledge of and belief in health benefits may motivate the initial involvement in exercise. The problem is that both active and inactive respondents view exercise as a positive health behavior. Both joggers and non-exercisers tended to believe that regular jogging would

yield health benefits, but these beliefs were unrelated to regular exercise or fitness status (Slenker et al., 1984). Sallis et al. (1986) reported that health knowledge was associated with improved maintenance of lifestyle activities while not with participation in vigorous activities.

In the study of Heinzelmann and Bagley (1970), the participants listed the desire to feel better and healthier as the most important influence in their participation in exercise but they also indicated a desire to gain health knowledge as important. At the program's close the participants also listed health and fitness benefits as a feature of the program they liked best. In this study, however social factors were more influential in adherence over time than were health benefits.

Active people are more knowledgeable than inactive people and more concerned about health benefits, but it is not clear from research if that knowledge is a predecessor or a consequence of the increased activity. Further study related to specific types of knowledge and their effects on exercise habits is needed as is further investigation of the relationship between health beliefs and exercise adherence from a causal vantage point.

Intention. Although intention to exercise is seen to have a positive influence on exercise, only two studies were found in addition to the studies previously cited by Godin (1987, 1994a, 1994b) that specifically studied intention. Seventh grade students were surveyed by Reynolds, Killen, Bryson, Maron, and Farquhar (1990) and data were collected at 4 and 16 months post-baseline. Intention to exercise was correlated to exercise for males and females at all levels of comparison except for males at 4 months post-baseline. No reason or possible explanation was presented for this lack of correlation.

In the Courneya and McAuley (1994) study, the relationship between intention and exercise, although not strong, was positive. Behavioral expectation which more closely paralleled self-efficacy showed higher significance in this study. Because this college student survey was conducted in January, which is a low exercise month, the reliability of the results may have been weakened. Because both these studies were conducted on relatively young populations, more studies of broader age categories are needed before results can be generalized to the total population.

Self-efficacy. The determinant most significantly correlated with activity level in the studies reviewed was self-efficacy. Self-efficacy related to an individual's belief in his/her ability to make changes related to exercise. It has been suggested that a person must go beyond intending to exercise to believing the activity can be successfully performed before exercise will take place.

Reynolds et al. (1990), in an attempt to study the relationship between activity and self-efficacy in adolescents, collected data from 365 male and 324 female students from a northern California high school 10th grade class. A self-report of activity, which recorded validity based on regular exercisers having lower resting heart rates than non-regular exercisers, and a questionnaire to assess intention, self-efficacy, and social influences were completed by the students. Higher self-efficacy was correlated with higher activity levels for males and females at 4 months post- baseline and for females at 16 months post baseline. Similar results were found in the Sallis et al.(1986) study among 1411 California adults. Self-efficacy was significantly correlated to vigorous and moderate exercise for both men and women.

Although the Hovell et al. (1989) study dealt only with walking, self-efficacy was again the strongest correlate to activity level. The generalizability of this study was further limited by the sample's tendency toward well-educated, middle class Caucasians.

Duncan and McAuley (1993) specifically measured social support and self-efficacy in their study of middle aged healthy adults. The questionnaire items relating to self-efficacy demonstrated adequate Cronbach alpha reliabilities. Self-efficacy was approached not only as a primary determinant of exercise adherence, but also as a mediator in the relationship between social support and health promoting behaviors, specifically exercise. Their finding that social support influenced exercise behaviors indirectly, supports the idea that self-efficacy may be a mediating variable explaining the effects of social relationship on regular exercise and lends more strength to its credibility as a primary determinant of exercise.

The sample studied by Sallis et al. (1989) showed self-efficacy again to be the strongest correlate of exercise and was almost two times more highly correlated to exercise than were the next highest correlates of modeling and friend support. Because the authors of this study were more interested in variables that might be associated with both self-efficacy and vigorous exercise the statistical analysis on the gathered data was repeated, omitting self-efficacy. Their results suggest that self-efficacy for exercise could be favorably influenced by positive experiences with exercise, observation of others exercising, encouragement to exercise, and exercising at a comfortable intensity. These findings seemed especially practical in an investigation of what actually might be implemented to positively influence exercise.

Summary of Specific Exercise Determinants

This review has revealed that although some determinants appear to influence exercise adherence positively, others have a negative influence. Some variables appear to not exert influence in either direction. Most determinants were not unanimously influential in one direction, which indicates the need for further study and also allows for possible misinterpretation as to the overall influence of a particular determinant.

The self-report method used in the majority of the studies reviewed limited the precision of measurement as it was not completely objective and quantifiable, but mistakes made as a result of this lack of precision would tend to lessen the significance of the findings rather than exaggerate them. The overrepresentation of white, middle-to-upper-middle-class adult males limited the generalizability of the findings and also suggested the need for further broader-based samplings and samplings of other specific populations.

In spite of the possible weaknesses cited, the findings of these studies seemed to indicate that although sports participation did not consistently influence exercise adherence, advancing age, distance to the facility, lack of equipment, and high intensity each exerted a negative influence on exercise adherence. On the opposite side, male gender, higher SES, knowledge of health benefits and intention to exercise were seen as positive influences. Four determinants were viewed as strongly positive in their influence because of an overwhelming amount of support in a positive direction. Self-efficacy, enjoyment, habit, and social support seemed to exert undeniable influence toward exercise adherence.

The final section of this survey of literature will briefly summarize the findings revealed through the study of theory and of specific determinants and will relate those findings to the college setting.

## Summary of Research as Related to the Collegiate Environment

Although exercise determinants have been identified, they are still poorly understood as illustrated by the 40% of the population that remain sedentary. There is a great need for further study of factors that contribute to exercise adherence, with an accompanying need to study these factors in specific exercise situations.Because this study deals with the potential for the collegiate setting to determine adult exercise habits, this section will summarize the research findings of this literature review as related specifically to the college environment.

In the late adolescent and early adult years (ages 18-21) general physical activity declines (Kemper, 1994). With this decline in physical activity is an accompanying decline in parental influence and sport involvement. This decrease in sports participation can be partially explained by the decrease in number of sports opportunities after leaving the structured club and interscholastic sports environment of the high school setting. Well-rounded college instructional, intramural, recreational, and intercollegiate sports programs can increase the opportunities for sports participation for the college age young adult.

As sports involvement decreases at this stage of life, participation in lifetime activities increases (Sallis et al., 1986; Stephens et al., 1985). College curricular and extracurricular activities can provide opportunities to learn and participate in a variety of

moderate lifetime activities that are more likely to be maintained and transferred into post-college adulthood than the more vigorous team sports.

Health knowledge has been shown to influence adoption of moderate activity and can be taught directly through college curricular offerings. Besides health knowledge, knowledge of proper use of exercise equipment and knowledge of exercise skills are both effective in developing self-efficacy (Bandura, 1982; Godin, 1994b). This self-efficacy positively influences exercise adherence. Providing knowledge of use of equipment and exercise skills can be a part of a college program, perhaps more easily than at any other stage of life.

Significant environmental barriers such as distance to facilities and access to programs can be minimal on a college campus. Exercise opportunities are usually no farther than the fieldhouse or gymnasium and are available at no cost to students.

Social influences of modeling and peer influence increase in strength in the college age group (Greendorfer, 1983; Sallis, et al., 1989). The college, complete with knowledgeable faculty and a core of active students, can serve these social influences well. Exercising with friends or partners contributes to the enjoyment of the activity (Heinzelmann & Bagley, 1970; Kendzierski & DeCarlo, 1991) and the collegiate setting provides the best scenario to find a large pool of friends and exercise partners.

All of these advantages of the college setting increase the probability of developing habits and encouraging adherence to programs for longer than the three to six months which are shown to lead to higher levels of maintenance of activity (Dishman, 1985; Dishman, Sallis, & Orenstein, 1985; Oldridge, 1982; & Triandis, 1977).

It should be possible to establish what determinants at one age (e.g. college age) can be altered to increase the likelihood that a person will be active at another age (e.g. adulthood). This review of literature made that research a possibility.

The model depicted in Figure 1 summarizes the findings of this survey of literature of theory and specific determinants and presents a practical view of the interrelationship of the determinants of exercise as investigated in this study. The weaker positive or negative determinants of exercise adherence (intention, perceived barriers, health knowledge, intensity, age, gender, SES, and sport participation) are viewed as influencing exercise adherence through their effect on the stronger determinants of habit, enjoyment, social support and self-efficacy which more directly and strongly influence exercise adherence.

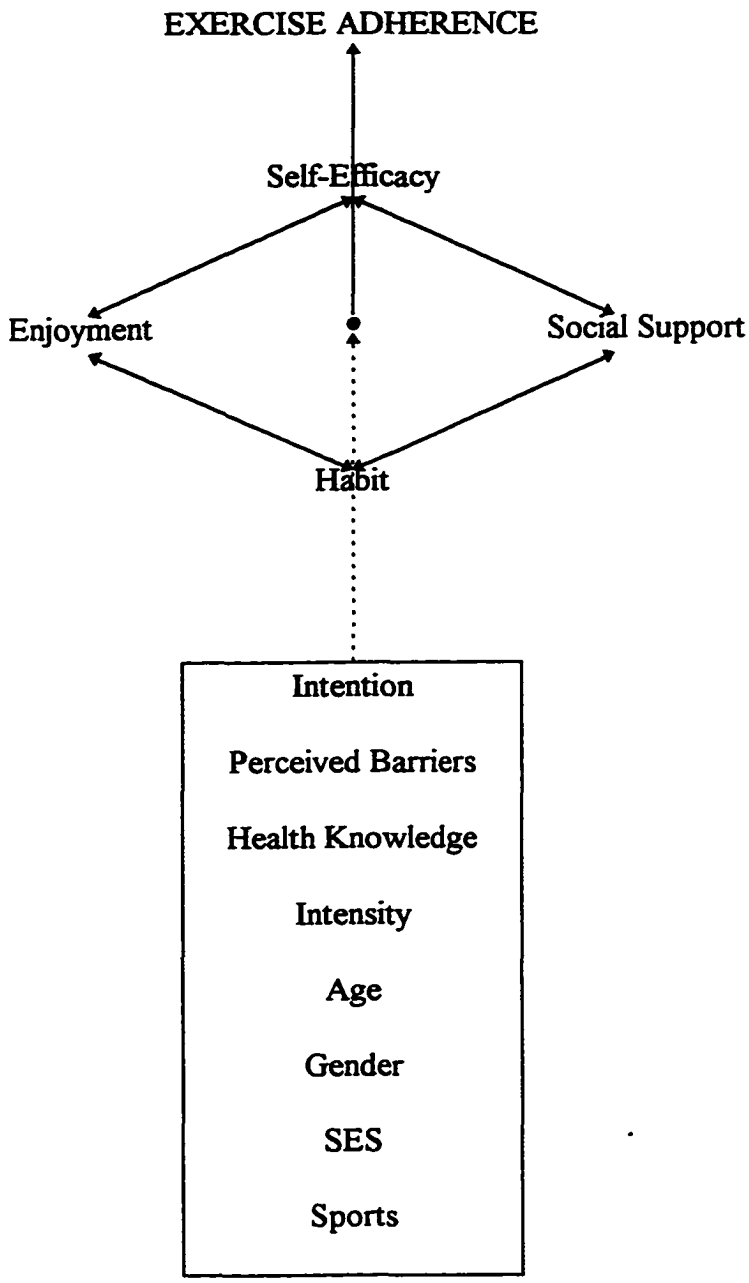



Figure 1. Relationship of independent variables to dependent variable of exercise adherence.

# CHAPTER 3

# RESEARCH METHODOLOGY

This study was designed to determine a profile of graduates who are physically more active as compared with those graduates who are less active. Dividing the graduates into active level groups permits study of the relationships of each group to the independent variables. Predictions of the potential for exercise adherence can then be made based on an individual's relationship to these independent variables. The purpose of this chapter is to describe the methods and procedures used in this quantitative study.

## Research Design

This descriptive/correlational research was designed to test hypotheses related to graduates' physical activity habits as children, while attending Milligan College, and since graduation, to develop a profile of the undergraduate student most likely to be active after graduation from Milligan College, and to investigate possible relationships between specific determinants of exercise and exercise adherence. The research design included five phases: (a) population studied, (b) evaluation instrument design, (c) pilot test of the instrument, (d) data collection procedures, and (e) data analysis procedures. The five phases of the research design are described in detail in five separate sections.

## Population

The population chosen for study consisted of 1994, 1995, and 1996 graduates of Milligan College. These graduates were both males and females who had received a Bachelor of Arts, Bachelor of Science, or Bachelor of Science in Nursing degree. The years 1994 through 1996 were chosen because recent graduates were a part of the curriculum and activities nearest those that presently are offered at Milligan,and also because they would have good recall of activities in which they were involved.

## The Evaluation Instrument

Because of demonstrated reliability of the Physical Activity Questionnaire developed by Young and Steinhardt (1993), the self-report method was chosen to measure physical activity levels for this study. This assessment instrument was then incorporated into a larger questionnaire, the Milligan Alumni Activity (MAA) Questionnaire (see Appendix A), which was designed by the researcher.

The Physical Activity Questionnaire was modified by Young and Steinhardt from the original scale designed by Weir, Jackson, and Pinkerton (1989), and was designed to measure overall activity instead of only leisure time activity. Subjects were asked to report their overall physical activity, with a range from 0 (avoids walking or exertion) to 10 (runs over 24 miles per week or spends over 8 hours per week in comparable physical activity). This instrument showed significant correlation with maximal treadmill time, $r(407) = .59$, $p < .001$, in the study's sample. Test-retest reliability determined on a random subsample of 47 subjects yielded an interclass correlation of $r = .89$ (Young & Steinhardt, 1993).

The 10 categories were collapsed into quintiles for statistical analyses based on natural breakpoints in the scale and relabeled as follows: Category 0,1 = 1, or low activity; Categories 2,3 = 2 or moderate activity; Categories 4,5 = 3 or less than 60 minutes per week of vigorous activity; Categories 6,7 = 4, or 1 to 6 hours per week of vigorous activity; and Categories 8,9,10 = 5, or more than 6 hours per week of vigorous activity. The categorized scale showed significant correlation with the original scale, Pearson $r$ (410) = .97, $p < .001$, $r$ (407) = .57, $p < .001$. The categorized five-point scale did not substantially reduce the information available from the full 0-10 scale (Young & Steinhardt, 1993).

In the researcher designed portion of the MAA Questionnaire, statements relating independent variables at Milligan College to the dependent variable of exercise adherence were developed to provide content validity. Independent variables were chosen as they related to the exercise determinants revealed in Chapter Two of this study. Students in a graduate wellness class at East Tennessee State University assisted in the analysis of the questions. A panel of experts was chosen to review the questionnaire for validity. The panel consisted of the Area Chair of Education, the Sub-Area Chair of Physical Education, the Vice President of Student Development, and the Vice President of Academic Affairs of Milligan College. The questionnaire was revised for pilot testing in accordance with the feedback from the expert review.

## Pilot Study

The MAA Questionnaire, as developed and revised by the researcher and the panel of experts, was pilot tested in August, 1996. The pilot study involved administering the MAA Questionnaire to a sample of randomly chosen alumni at Milligan College. Participants in the pilot study were given opportunity to indicate potential problems with the questionnaire and to make constructive suggestions for revision. The final MAA Questionnaire was developed based on results of the pilot study analysis and considerations of suggestions presented by those involved in the pilot study. Questions were deleted or reworded that were judged to be confusing. Several activities were added to the activities checklist that were hand written by the participants

## Data Collection

The finalized MAA Questionnaire was mailed to the 1994, 1995, and 1996 graduates of Milligan College who had received Bachelor of Science, Bachelor of Arts, or Bachelor of Science in Nursing degrees. A list of graduates was obtained from the Alumni Office at Milligan College. This office is responsible for all correspondence with Milligan alumni and has the most complete and accurate record of graduate residences available. A cover letter explained the purpose of the MAA Questionnaire. Each questionnaire and return envelope was coded with an identification (ID) number that corresponded with a master list of graduates. This was done to ensure confidentiality and to allow returned questionnaires to be readily identifiable. Returned questionnaires were checked by envelope ID number as they were received, were then removed from the envelopes, and were placed randomly in a box. They were not viewed until they were separated from the

master list of graduates so that no comparisons of ID numbers and names was possible. Two weeks after the first mailing a follow-up letter and questionnaire were mailed to those not responding. At the study's completion, results of this study were published in the alumni newsletter, The Millagenda, that is mailed to each Milligan College alumnus.

## Data Analysis

The dependent variable calculated for each graduate was the activity level and was designated as low (1); moderate (2); vigorous,< 1 hour per week (3); vigorous, 1-6 hours per week (4); or vigorous, > 6 hours per week (5) as self-reported in section I of the MAA Questionnaire. Independent variables were selected from the results of the review of literature and included categories of: (a) participation in specific college activities, (b) preferences for types of exercise, (c) social influence and influence of models, (d) influence of a required freshman fitness course, and (e) environmental barriers. The research questions addressed were:

1. Do differences exist between the activity levels of graduates based on their gender or their present socioeconomic level?

2. Do differences exist between the activity levels in relation to exercise self-efficacy, exercise attitude, exercise habits, and exercise preferences.

3. Do differences exist between the activity levels in relation to their participation in sports and fitness activities?

4. Do differences exist between the activity levels in relation to social influences?

5. Do differences exist between the activity levels in relation to the identification of barriers to exercise during the time period while undergraduates at Milligan and the time period since graduation from Milligan?

6. Do differences exist between the activity levels in the evaluation of the Fitness for Life course?

8. Do differences exist between the activity levels in relation to the perception of health benefits related to exercise or health knowledge?

9. What suggestions were presented to improve the exercise environment at Milligan?

To answer these questions, ANOVA statistics were computed to compare the means of the dependent variables (by subscales) of the five groups. In comparing the five groups, the null hypothesis was stated for each of the dependent variables and the 0.05 level of significance was used as the alpha level to test the hypotheses. Multiple regression analysis was used to determine the relationship between the dependent variable (physical activity level) and a combination of two or more independent variables.

Hypothesis 1. There is no difference between the exercise groups with respect to gender.

Hypothesis 2. There is no difference between the exercise groups with respect to the respondent's socioeconomic level.

Hypothesis 3. There is no difference between the exercise groups with respect to physical self-efficacy.

Hypothesis 4. There is no difference between the exercise groups with respect to enjoying exercise.

Hypothesis 5. There is no difference between the exercise groups with respect to past exercise habits.

Hypothesis 6. There is no difference between the exercise groups with respect to intensity level of activities.

Hypothesis 7. There is no difference between the exercise groups with respect to participation in sports and fitness activities.

Hypothesis 8. There is no difference between the exercise groups with respect to family and friend exercise support.

Hypothesis 9. There is no difference between the exercise groups with respect to types of perceived barriers to exercise.

Hypothesis 10. There is no difference between the exercise groups with respect to evaluation of the required Fitness for Life course.

Hypothesis 11. There is no difference between the exercise groups with respect to beliefs and benefits related to exercise.

Hypothesis 12. There is no difference between the exercise groups with respect to health knowledge.

Hypothesis 13. There is no difference between the exercise groups with respect to suggestions to improve the exercise environment at Milligan.

Hypothesis 14. There is no relationship between the dependent variable and a combination of two or more independent variables.

# CHAPTER 4

## RESULTS AND ANALYSIS OF DATA

The purpose of this chapter is to report the results of this study as they relate to the specific research questions and hypotheses. First, a demographic summary of the population studied is presented to establish the context in which the data may be interpreted. Second, the differences between respondents by activity levels are examined through the testing of the stated hypotheses. Third, a profile of the physically active student's characteristics is presented. Finally, an assessment of those variables that may serve as predictors of activity is presented.

### Demographic Profile

The population chosen for this study consisted of the 1994, 1995, and 1996 graduates of Milligan College who had received a Bachelor of Arts, Bachelor of Science, or Bachelor of Science in Nursing degree. The master list obtained from the Alumni Office consisted of 351 graduates. Of this number, 211 responded with completed questionnaires for a response rate of 60.1%.

Among the 211 respondents, 62.6% were female and 37.4% were male. This percentage breakdown reflects the high percentage of female students enrolled at Milligan during the years studied. The analysis found 45.5% of the subjects from the 1996 graduating class, 27.0% from the 1995 graduating class, and 27.5% from the 1994 graduating class. This higher percentage for 1996 may be explained by the fact that the

class of 1996 was the largest class numerically and also by the fact that there was a higher likelihood of correct addresses for those most recently graduating. The average income of the respondents was between $20,000-30,000 as reflected in Table 3.

TABLE 3

INCOME LEVELS OF SUBJECTS IN STUDY

| Income level | *n* | % |
|---|---|---|
| unemployed | 28 | 13.5 |
| $10,000-19,999 | 81 | 39.1 |
| $20,000-29,999 | 70 | 33.8 |
| $30,000-39,999 | 15 | 7.2 |
| $40,000-49,999 | 8 | 3.9 |
| ≥$50,000 | 5 | 2.4 |
| Total | 207 | 100.0 |

The average age of the respondents was 25.4 years and the median age was 24 years. Of the population, 91.5% were between the ages of 21 and 30, with 8.5% older than 30 years of age. Data analysis revealed 50.7% were married, 48.3% single, with 1.0% not indicating marital status.

## Differences Between Subjects of Different Activity Levels

The 211 respondents were grouped into categories by activity levels as a result of their response to a self-report measure of physical activity. This self-report was calculated from the Physical Activity Level Assessment section of the MAA Questionnaire (see Appendix A for the complete scale). The scale ranged from 0 (avoids walking or exertion) to 10 (runs over 25 miles per week or spends over 8 hours per week in comparable physical activity). This scale was collapsed by Young and Steinhardt (1993) into quintiles for statistical analysis based on natural breakpoints in the scale and relabeled as follows: categories 0-1 = 1, or low activity; categories 2-3 = 2, or moderate activity; categories 4-5, = 3 or less than 60 minutes per week of vigorous activity; categories 6-7 = 4 or 1 to 6 hours per week of vigorous activity; and categories 8-10 = 5 or more than 6 hours per week of vigorous activity.

Comparisons between these categories and activity factors provided the basis for analysis. The distribution by activity levels is displayed in Table 4.

## Research Question One - Do Differences Exist Between The Activity Levels When Comparing Gender Or Socioeconomic Level?

The variable chosen as the dependent variable in this study was activity level (1-5), although the demographic variables served as independent variables. Research hypotheses 1 and 2 were analyzed in response to the first research question.

Hypothesis 1. There is no difference between the activity levels with respect to gender.

TABLE 4

FREQUENCY OF RESPONDENTS BY ACTIVITY LEVELS

| Physical Activity Level | Frequency | Percent |
|---|---|---|
| 1 - low activity | 34 | 16.1 |
| 2 - moderate activity | 61 | 28.9 |
| 3 - < 60 min./wk of vigorous activity | 52 | 24.6 |
| 4 - 1-6 hours/wk of vigorous activity | 47 | 22.3 |
| 5 - >6 hours/wk of vigorous activity | 13 | 6.2 |
| no response | 4 | 1.9 |
| Total | 211 | 100.0 |

The results of this study indicated that males had a significantly higher activity level than females (Males = 3.0, females = 2.5) when all activity levels were considered together, $t(1,205) = 3.05$, $p = 0.003$. When a cross-tabulation was performed (Table 5) several important observations were evident.

Activity level for males was higher than for females. Level one, the lowest activity level, contained only 6.3% of the males but 22.7% of the females, although level five, the highest level, contained 11.4% of the males and only 3.0% of the females, as shown in Table 5. The middle three activity levels, however, showed less variance in activity level by gender as the rated mean of activity levels 2, 3, and 4 combined was 27.4% for males and 24.7% for females.

TABLE 5

ACTIVITY LEVEL BY GENDER

| GENDER | Activity 1 | | Activity 2 | | Activity 3 | | Activity 4 | | Activity 5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | *n* | % | *n* | % | *n* | % | *n* | % |
| Male | 5 | 6.3 | 23 | 29.1 | 24 | 30.4 | 18 | 22.8 | 9 | 11.4 |
| Female | 29 | 22.7 | 38 | 29.7 | 28 | 21.9 | 29 | 22.7 | 4 | 3.1 |

In general, the null hypothesis is rejected. Gender effects were significantly different between males and females $t(1,205) = 3.05$, $p = 0.003$. These differences were most evident at the lowest and highest activity levels, although at the median activity levels males and females were quite similar.

Hypothesis 2. There is no difference between the activity levels with respect to socioeconomic level.

The respondents' level of income was used as an indicator of socioeconomic status. There was no statistically significant difference in activity level based on the respondents' income level. The null hypothesis is not rejected. When correlation was computed, there also was no significant relationship found between income and activity level ($r = -0.06$, $p = 0.435$).

Research Question Two. Do Differences Exist Between The Activity Level In Relation To Exercise Self-Efficacy, Exercise Attitude, Exercise Habits, And Exercise Preferences?

Research hypotheses 3 through 6 were analyzed in response to the second research question.

Hypothesis 3. There is no difference between the activity levels with respect to physical self-efficacy.

Activity level was analyzed in relation to exercise self-efficacy by considering six items from the MAA Questionnaire. These items were taken from Section IV and Section V of the questionnaire that consisted of Likert-type questions with rating scales of 1-3 or 1-5. Respondents from higher activity levels rated their exercise self-efficacy higher than respondents from lower activity levels on each of the six items. There was a statistically significant difference in activity level based on the respondents' perceived level of skill, confidence in abilities, perceived skill level for exercise, confidence in sports and physical activities, general fitness, and confidence in completing an exercise program for all subjects combined. A listing of each item, a description of that item, and the appropriate statistical value is included in Table 6.

A new variable was created by adding the individual self-efficacy variable responses that showed a significant relationship with physical activity. Respondents from higher activity levels had significantly higher scores on the new total self-efficacy variable than did respondents from lower activity levels $F(22,183) = 3.09$, $p = 0.001$. The null hypothesis is therefore rejected.

TABLE 6

ANALYSIS OF EXERCISE SELF-EFFICACY ITEMS THAT PROVED TO BE STATISTICALLY SIGNIFICANT FOR ACTIVITY LEVEL

| Item | Description | Statistical Value |
|---|---|---|
| 5, IV | Your perceived level of physical skills or abilities | $F(4,198) = 9.96, p = 0.003$ |
| 3,V | I am confident of my abilities in sports, exercise, and other physical abilities. | $F(4,201) = 4.28, p = 0.002$ |
| 15,V | My physical skills are at a high enough level to complete any exercise program I would choose to undertake. | $F(4,205) = 9.28, p = 0.001$ |
| 18 V | Many sports and physical activities are too difficult for me. | $F(4,201) = 6.1, p = 0.001$ |
| 21,V | I possess good general physical fitness. | $F(4,204) = 19.6, p = 0.001$ |
| 22 V | I do not feel capable to complete an exercise program. | $F(4,201) = 5.3, p = 0.004$ |
| | Self-efficacy variable | $F(22,183) = 3.1, p = 0.000$ |

When activity level was analyzed by collapsing the higher two activity levels into one high activity group and collapsing the lower two activity levels into one low activity group and omitting the middle level, several important findings were discovered. To determine what relationships existed between activity level and the self-efficacy variables,

a correlation matrix was computed for the individual self-efficacy items and high/low activity. When all subjects were considered, each self-efficacy variable showed a significant correlation to activity level. When gender was considered, males revealed a significant correlation on five of the six self-efficacy variables, although females did so on four self-efficacy variables. Males were also more strongly correlated for the self-efficacyvariables in each variable except the variable dealing with the difficulty of an activity. This variable revealed females' self-efficacy to be more highly correlated with the relative ease of an activity than males' self-efficacy. A summary of self-efficacy to high/low activity levels is shown in Table 7.

Because there were five variables significantly correlated to activity level for males and four for females, further statistical analysis related to gender was based on the creation of a distinct summed self-efficacy score for males and a distinct summed self-efficacy for females. Based on the resulting scores, self-efficacy appears to be affected by activity level for both males and females. The mean for low activity females (12.22) was 16.7% lower than the mean for high active females (14.27), $t(1,129) = 4.20$, $p = 0.001$. The mean for low active males (16.69) was 22.7% lower than the mean for high active males (20.56), $t(1,75) = 4.44$, $p = 0.001$ A relative self-efficacy score was computed by dividing the mean for females at each activity level by 18 (highest score possible on the four related items) and for males at each activity level by 23 (highest score possible on the five related items). The males' relative self-efficacy score was 12.7% higher than the females' in the low activity group and 7.3% higher than the females' in the high activity group (see Table 8).

TABLE 7

ANALYSIS OF CORRELATION OF SELF-EFFICACY

VARIABLES TO HIGH/LOW ACTIVITY LEVEL

| Item | Self-efficacy description | Total (N=153) correlation = r significance=*p* | Male (N=54) correlation = r significance=*p* | Female (N=99) correlation = r significance=*p* |
|---|---|---|---|---|
| 5, IV | Your perceived level of physical skills or abilities. | r=0.310 *p*=0.001* | r=0.418 *p*=0.002* | r=0.200 *p*=0.052 |
| 3,V | I am confident of my abilities in sports, exercise, and other physical abilities. | r=0.211 *p*=0.009* | r=0.232 *p*=0.091 | r=0.161 *p*-0.109 |
| 15,V | My physical skills are at a high enough level to complete any exercise program I would choose to undertake. | r=0.335 *p*=0.001* | r=0.453 *p*=0.001* | r=0.231 *p*=0.021* |
| 18 V | Many sports and physical activities are too difficult for me. | r=0.301 *p*=0.001* | r=0.310 *p*=0.022* | r=0.263 *p*=0.008* |
| 21,V | I possess good general physical fitness. | r=0.481 *p*=0.001* | r=0.468 *p*=0.001* | r=0.475 *p*=0.001* |
| 22 V | I do not feel capable to complete an exercise program. | r=0.210 *p*=0.010* | r=0.322 *p*=0.001* | r=0.073 *p*=0.476 |

* $p < .05$

TABLE 8

SELF-EFFICACY MEANS BY GENDER AND ACTIVITY GROUP

| Activity Group | Mean | Highest Possible Score | Relative Score* Self-efficacy |
|---|---|---|---|
| Low males (n=26) | 16.77 | 23 | .728 |
| Low females (n=64) | 12.21 | 18 | .678 |
| High males (n=50) | 20.56 | 23 | .893 |
| High females (n=67) | 14.27 | 18 | .792 |

*Relative Score Self-efficacy = Mean/Highest Possible Score

Very interestingly, at the lowest activity level of the five activity groups, females had 27.9% higher relative self-efficacy ratings than males. In each of the remaining four activity levels, males' self-efficacy ratings were higher than females' self-efficacy ratings, with the least difference in the highest activity level where males were only 3.4% higher than females (see Figure 2).

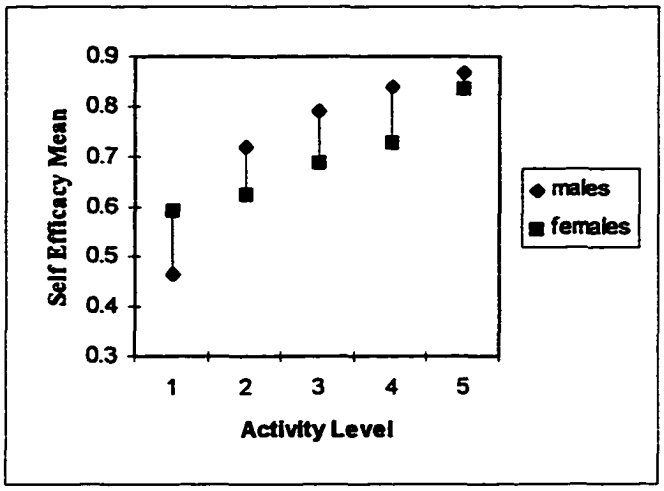



Figure 2. Relative self-efficacy means by activity level and gender.

Hypothesis 4. There is no difference between the activity levels with respect to enjoying exercise.

Activity level was analyzed in relation to exercise attitude by considering items 1 and 10 from Section V of the MAA Questionnaire which deals with enjoyment. Section V, item 1 asked for agreement with the statement, "I look forward to physical activity." Respondents from higher activity levels showed significantly more agreement with the statement than did respondents from lower activity levels, $F(4,200) = 15.76$, $p = 0.001$. Section V item 10 asked for agreement with the statement, "Physical activity is drudgery." Respondents from higher activity levels showed significantly less agreement with the statement than did respondents from lower activity levels, $F(4,198) = 8.39$, $p=0.001$.

A new variable was created by adding both the attitude variable responses, after reverse coding item 10. Respondents from the higher activity levels had significantly

higher scores on the new enjoyment variable than did respondents from lower activity levels, $F(8,197) = 6.56$, $p = .001$. The null hypothesis is therefore rejected.

To determine if a relationship existed between high/low activity level and enjoyment, a correlation was computed for the totaled enjoyment variable. A significant correlation between enjoyment and the high/low activity level was discovered ($r = 0.385$, $p = 0.001$). Analysis by gender showed a significant correlation to high/low activity level for both males ($r = 0.397$, $p = 0.003$) and females ($r = 0.369$, $p = 0.001$).

Further statistical analysis revealed that enjoyment was significantly influenced by activity level but not by gender. The mean for the high activity group (8.40) was 20.5% higher than the mean for the low activity group (6.97), $F(1,151) = 26.31$, $p = 0.001$, but the means for males and females differed by only 1% in the low active group and 2% in the high active group (See Figure 3).

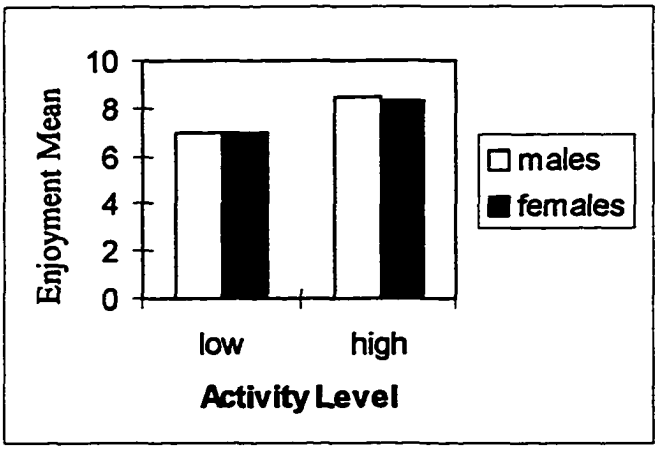



Figure 3. Enjoyment level influenced by activity level and by gender.
High > low, $F(1,151) = 26.31$, $p = 0.001$

Hypothesis 5. There is no difference between activity levels with respect to past exercise habits. Activity level was analyzed in relation to exercise habit by considering three items from Section V of the MAA Questionnaire.

Section V item four asked for agreement with the statement, "I have been a regular exerciser most of my life." Respondents from higher activity levels showed more agreement with the statement than did respondents from lower activity levels. There was a statistically significant difference in activity level based on the respondents being regular exercisers, $F(4,201) = 11.53, p = 0.001$.

Section V, item 13 asked for agreement with the statement, "I frequently quit an exercise program within the first six months." Respondents from lower level exercise groups showed more agreement with the statement than did respondents from higher exercise groups. This item was reverse coded for inclusion with other variables. There was a statistically significant difference in activity level based on the respondents' continuing an exercise program, $F(4, 201) = 6.92, p = 0.001$.

Section V, item 14 asked for agreement with the statement, "In comparison to others my age, I exercise more." Respondents from higher activity levels showed more agreement with the statement than did respondents from lower activity levels. There was a statistically significant difference in activity level based on the respondents' quantity of exercise as compared with others their age, $F(4,201) = 27.83, p = 0.001$.

After reverse coding item 13, these three variables were added to create a single habit variable. There was a statistically significant difference in activity level based on the

respondents' exercise habit, $F(12,193) = 8.8$, $p = 0.001$. The null hypothesis was therefore rejected.

The correlation between high/low activity level and the totaled habit variable was $r = 0.554$, $p = 0.001$. Further analysis of the relationship between habit and high/low activity revealed habit to be affected by activity and gender. The high level activity group had a 39.7% higher habit rating than the low activity group (low activity group mean = 7.89; high activity group mean = 11.06), $t(1,152) = 7.86$, $p = 0.001$. The habit mean for males was 9.87 and the mean for females was 8.71, which revealed males to be 13.3% higher in habit rating than females $t(1,152) = 2.99$, $p = 0.001$. When comparing males and females at the high and low activity levels however, no significant differences occurred. In the low activity group males showed a 9% higher rating than females, although at the higher activity level, males showed only an 8% higher rating than females. (see figure 4).

Hypothesis 6. There is no difference between the activity levels with respect to intensity level of activities.

Activity level was analyzed in relation to exercise intensity level by considering items 3 and 4 from Section IV of the MAA Questionnaire. Item 3 asked each subject to select the type of exercise intensity most often chosen at present. Possible choices were mild, moderate, or vigorous, and they were coded as 1-3. Respondents from higher activity levels were significantly more likely to engage in higher intensity activities than were respondents from lower activity levels $F(2,197) = 39.43$, $p = 0.001$.

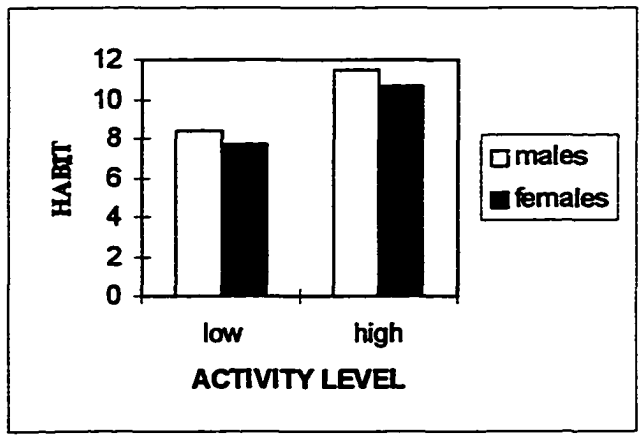



Figure 4. Habit means as influenced by activity level and gender.
High active > low active $t(1,152) = 7.86, p = 0.001$; males > females $t\ (1,152) = 2.99, p = 0.001$; low active males 9% higher than females; high active males 8% higher than females.

Item 4 asked each respondent to select the type of exercise intensity most often chosen while at Milligan. Respondents from higher activity levels were significantly more likely to engage in higher intensity activities while at Milligan than were respondents from lower activity levels $F(2,198) = 22.03, p = 0.001$. The null hypothesis is therefore rejected.

The items related to exercise intensity showed a relationship between higher activity levels and higher intensity levels both at Milligan ($r = 0.444, p = 0.001$) and after leaving Milligan ($r = 0.541, p = 0.001$). It is interesting to note, however that when comparing the mean intensity levels of subjects at Milligan and after leaving Milligan the exercise intensity level across the activity levels decreased significantly $t(1,144) = 2.19$, $p = 0.030$. Comparison of the high activity group and the low activity group revealed a slight decrease in intensity level in the high activity group (1.2%) and a more pronounced decrease in the low activity group (14.9%). The low activity group was 12.4 times more likely to decrease in exercise intensity after leaving Milligan than was the high exercise

group. When gender was considered in the change in intensity level, the decrease was significant for males across both activity levels, $t(1,50) = 2.66, p = 0.010$, although the decrease for females was not. Interestingly, the high activity female group was the only group to show no decrease in activity level. A summary of mean intensity levels is shown in Table 9.

TABLE 9

MEAN INTENSITY LEVEL OF ACTIVITY GROUPS AND DECREASE IN INTENSITY FROM TIME AT MILLIGAN TO TIME AFTER MILLIGAN

| Activity Group | Mean intensity level while at Milligan | Mean intensity level after Milligan | Decrease in intensity |
|---|---|---|---|
| Low level (All subjects) | 2.00 (N=88) | 1.74 (N=89) | 14.9% |
| High level (All subjects) | 2.56 (N=60) | 2.53 (N=58) | 1.2% |
| Men low level | 2.23 (N=26) | 1.73 (N=26) | 28.9% |
| Women low level | 1.90 (N=62) | 1.75 (N=63) | 8.6% |
| Men high level | 2.81 (N=26) | 2.73 (N=26) | 3.0% |
| Women high level | 2.38 (N=34) | 2.37 (N=32) | 0.4% |

Research Question Three - Do Differences Exist Between The Activity Levels Based On Participation In Sports And Fitness Activities.

Research hypothesis 7 was analyzed in response to the third research question.

Hypothesis 7. There is no difference between the activity levels with respect to participation in sports and fitness activities. Section III of the MAA Questionnaire analyzed activity level in relation to participation in sports and fitness activities. Respondents were asked to check activities in which they participated during their youth, while at Milligan, and after Milligan. This section was also subdivided into sections labeled team sports, individual sports and fitness activities. Data across the five activity levels were analyzed by comparing the sums of team sports, individual sports, and fitness activities at the various age divisions. A new total activity variable was created for each age division by adding the totals of team sports, individual sports, and fitness activities.

For the youth age division when analyzing involvement in team sports, respondents from higher activity levels showed significantly more participation in team sports than respondents from lower activity levels, $F(12,194) = 2.22$, $p = 0.012$. Participation in individual sports, fitness activities or total youth activities did not significantly influence activity level.

While at Milligan, respondents from higher activity levels showed more participation in team sports, fitness activities, and total activities than did respondents from lower activity levels. There was a statistically significant difference in activity level based on respondents' participation in team sports, $F(6,200) = 8.30$, $p = 0.001$; in fitness activities, $F(11,195) = 3.27$, $p = 0.001$; and based on total activities while at Milligan,

$F(16,190) = 2.54, p = 0.047$. No relationship was found between activity level and participation in individual sports.

After Milligan, respondents from higher activity levels showed more participation in team sports, individual sports, fitness activities, and total activities than did respondents from lower activity levels. There was a statistically significant difference in activity level based on the respondents' participation in team sports, $F(5,201) = 5.65, p = 0.001$; individual sports, $F(5,201) = 4.26, p = 0.001$; fitness activities, $F(11,195) = 5.32$, $p = 0.001$; and based on the respondents' participation in total activities after Milligan, $F(15,191) = 6.06, p = 0.001$.

Activities across all three time periods were added to create the variables total team sports, total individual sports, and total fitness activities. A fourth variable of total activities summed all activities for all time periods. Respondents from higher activity levels showed significantly more participation in total team sports, $F(18,188) = 2.68, p = 0.001$; total fitness activities, $F(21,185) = 2.03, p = 0.001$; and total activities, $F(42,164) = 2.68$, $p = 0.046$ than did respondents from lower activity levels. No difference was found between activity level and total participation in individual sports. Table 10 indicates the presence or absence of a statistically significant difference between activity level and the various activities at the different time periods.

TABLE 10

PRESENCE OF A STATISTICALLY SIGNIFICANT DIFFERENCE BETWEEN ACTIVITY LEVEL AND VARIOUS ACTIVITIES BY TIME PERIOD

| Sport or Activity | Youth | At Milligan | After Milligan | Total |
|---|---|---|---|---|
| Team | 0.012 | 0.001 | 0.001 | 0.001 |
| Individual | | | 0.001 | |
| Fitness Activity | | 0.001 | 0.001 | 0.001 |
| Total | | 0.047 | 0.001 | 0.046 |

It is interesting to note that team sports was the only variable that was significantly different in each of the three stages of life, with team sports participation while at Milligan revealing the most significant difference. Although team sports, individual sports, and fitness activities impact activity level differently at the three different time periods there was a difference between exercise groups with respect to sports and fitness activities. The null hypothesis is therefore rejected. Further analysis revealed a strong relationship between each of these variables while at Milligan and after Milligan to high/low activity level.

There was not a relationship between team sports while at Milligan and fitness activities at Milligan, after Milligan, or total fitness activities when examining the total population. When analyzing relationship by gender, males at Milligan team sports score was not related to either fitness activities after Milligan or total fitness activities and

showed a weak relationship to fitness activities at Milligan ($r = 0.289$, $p = 0.01$). Team sports scores for women, however were related to fitness activities at Milligan ($r = 0.180$, $p = 0.039$). and fitness activities total ($r = 0.182$, $p = 0.037$) and although not related to fitness activities after Milligan, showed a stronger relationship to this variable than did males.

Of interest was the fact that the males' mean score in each variable activity count was higher than the female's mean score except in fitness activities where women's scores were higher. As one might suspect, team sports participation decreased after Milligan in all categories of activity level and gender (total decrease of 95%), although fitness activities increased overall (total increase of 17%) and increased in each category of activity level except women in the low active group (see Table 11).

Research Question Four - Do Differences Exist Between The Activity Levels In Relation To Social Influences.

Hypothesis 8 was analyzed to respond to research question four.

Hypothesis 8. There is no difference between the exercise groups with respect to family and friend exercise support. Activity level was analyzed in relation to social influences by considering three items from Section V of the MAA questionnaire.

Items 5, 6, and 23 asked for agreement with the statements, "I prefer to exercise with a group or friend," "My family strongly supports my exercising," and "I have friends who enjoy the same kinds of exercise that I do." Respondents who exercised at higher

who enjoy the same kinds of exercise that I do." Respondents who exercised at higher

TABLE 11

MEANS OF VARIOUS STATISTICALLY SIGNIFICANT SPORTS AND FITNESS ACTIVITIES VARIABLES BY ACTIVITY LEVEL AND GENDER

| Means of Activity Level | Milligan Team Sports | Milligan Fitness Activities | Milligan Activities Total | After Team Sports | After Fitness activities | Total Team Sports | Total Fitness Activities | Total Activities |
|---|---|---|---|---|---|---|---|---|
| Inactive (N=93) | 0.85 | 1.82 | 3.75 | 0.37 | 1.91 | 4.02 | 4.95 | 13.81 |
| Active (N=61) | 2.01 | 3.46 | 6.82 | 1.13 | 3.87 | 6.49 | 8.64 | 21.05 |
| Total (N=154) | 1.31 | 2.47 | 4.97 | 0.67 | 2.89 | 5.00 | 6.41 | 16.67 |
| Males Low (N=28) | 1.57 | 1.11 | 4.57 | 0.64 | 1.64 | 6.57 | 4.43 | 17.96 |
| Females Low (N=65) | 0.54 | 2.12 | 3.40 | 0.25 | 2.03 | 2.92 | 5.17 | 12.02 |
| Males High (N=27) | 3.04 | 2.70 | 7.41 | 1.85 | 3.56 | 9.96 | 8.37 | 24.44 |
| Females High (N=34) | 1.21 | 4.06 | 6.35 | 0.56 | 4.12 | 3.74 | 8.85 | 18.35 |

activity levels showed no more agreement with these statements than those from lower activity levels. A new social support variable was created by summing the three individual variables, and, again, there was no statistically significant difference in activity level and social support. When each of the social support items was used as the dependent variable and marital status as the independent variable, no significant differences were found. The null hypothesis was rejected.

Further statistical analysis revealed that high/low activity level was not significantly related to social support for the totaled variable nor to any of the three individual variables and also revealed no differences based on gender. The mean for the high activity group (11.35) was only 1.5% higher than the mean for the low activity group (11.17). Although the differences were not significant between genders, it is interesting to note that in the low active group the mean for men (11.14) was 0.1% lower than for the women (11.18), but in the high active group the mean for men (11.69) was 5.4% higher than for women (11.09).

In this study social support failed to influence exercise behavior directly but did influence self-efficacy. Using self-efficacy as the dependent variable and social support as the independent variable, a statistically significant difference was found, $F(11/295) = 2.17$, $p=0.017$. Although social support for the whole group did significantly influence self-efficacy, when broken into individual groups by gender, no significant differences were found, probably because of the lack of power when broken into the large number of social support groups. Self-efficacy of males seemed more related to social supports than of females as was the case when relationship was analyzed, social support scores for the

whole group (r = 0.220, p = 0.001) and for males (r = 0.325, p = 0.004) showed a significant relationship to self-efficacy, but scores for women approached significance (r = 0.162, $p = 0.064$).

Research Question Five. Do Differences Exist Between The Activity Levels In The Identification Of Barriers To Exercise While Undergraduates At Milligan And After Graduation From Milligan?

Research hypothesis 9 was analyzed in response to the fifth research question.

Hypothesis 9. There is no difference between activity levels with respect to types of perceived barriers to exercise. To address this hypothesis, the barriers section of Section III was analyzed. The respondents were asked in this section to check those items that served as frequent barriers to exercise in two columns labeled "at Milligan" and "after Milligan." From the list of 16 barriers, 1 barrier was statistically different by activity level while at Milligan and 5 were statistically different by activity level after Milligan.

The one statistically different barrier while at Milligan was labeled "lack of quality equipment," and showed respondents who exercised at higher activity levels more often checked "lack of quality equipment" as a barrier to exercise than did those who exercised at lower activity levels, $t(1,204) = 3.67, p = 0.003$. When all the barriers to exercise while at Milligan were added to create a single variable, there was no statistically significant difference in activity level based on the respondents' perceptions of the 16 items listed as barriers to exercise while at Milligan.

Five of the 16 barriers listed influenced activity level after Milligan, and in each case, respondents from the lower activity levels saw each item as a barrier more often than

those from the higher activity levels. There was a statistically significant difference in activity level based on the respondents' perception of a lack of willpower as a barrier to exercise, $t$ (1,203) = 2.58, $p$ = 0.002; a lack of physical competence as a barrier to exercise, $t$ (1,203) = 2.37, $p$ = 0.004; a lack of enjoyment as a barrier to exercise, $t$(1,204) = 2.87, $p$ = 0.004; a lack of social reinforcement as a barrier to exercise, $t$(1,204) = 2.58, $p$ = 0.027; and finally a lack of desire as a barrier to exercise, $t$(1,203) = 2.58, $p$ = 0.040. It is interesting to note that in all six cases where respondents from different activity levels perceived barriers to exercise differently, respondents from the lower activity levels more often perceived the item as a barrier.

When all the barriers to exercise after Milligan were added to create a single variable, there was no statistically significant difference in activity level based on the respondents' perceptions of the 16 items listed as barriers to exercise after Milligan. Although there were several items where the identification of barriers to exercise differed by activity level, there was no overall statistically significant difference in activity level. The null hypothesis is not rejected.

Further statistical analysis revealed that men indicated more barriers in the low activity group (3.96) then the high activity group (3.08), although the women listed more barriers to exercise in the high active group (3.65) than the low (3.29) while at Milligan. After Milligan both men and women listed more total barriers in all activity levels than while at Milligan and both genders indicated more barriers in the low activity group than the high (see Table 11).

The number of barriers while at Milligan was not significantly influenced by activity level for the total group, for males or for females, nor was there a significant gender influence found in any of the three groups.

Although the number of barriers to exercise after Milligan was not significantly influenced by gender, there was a statistically significant difference in the number of barriers by activity for the total group (high activity group 29.6% lower than low activity group), $t(1,152) = 2.18$, $p = 0.033$; and for the males (high activity group 44.5% lower than low activity group), $t(1,53) = 2.01$, $p = 0.049$. The females did not show a significant difference in the number of barriers by activity group, although the high activity group was 19.5% lower than low activity group after Milligan. Although each activity group indicated more barriers to exercise after leaving Milligan than while at Milligan, there was not a significant increase in the number of barriers, even when gender and activity level were considered (see Table 12).

Research Question Six. Do Differences Exist Between The Activity Levels In The Evaluation Of The Fitness For Life Course?

This research question was answered through analysis of hypothesis 10.

Hypothesis 10. There is no difference between activity levels with respect to evaluation of the Fitness for Life course. Activity level was analyzed in relation to evaluation of the required freshman Fitness for Life course by considering two items from

TABLE 12

MEANS OF BARRIERS TO ACTIVITY BY ACTIVITY GROUPS AND CHANGE IN GROUPS FROM TIME AT MILLIGAN TO TIME AFTER MILLIGAN

| Activity Group | Mean number of barriers at Milligan | Mean number of variables after Milligan | Change in number of barriers |
|---|---|---|---|
| Low level (N=93) | 3.49 | 4.73 | 35.5% |
| High level (N=60) | 3.40 | 3.65 | 6.8% |
| Males low level (N=28) | 3.96 | 4.61 | 16.4% |
| Females low level (N=65) | 3.29 | 4.78 | 45.2% |
| Males high level (N=23) | 3.08 | 3.19 | 3.5% |
| Females high level (N=34) | 3.65 | 4.00 | 9.5% |

Section IV and one item from Section V of the MAA Questionnaire. Question one from Section IV asked for an evaluation of the lecture portion and question two, the activity portion of this course. The respondents chose from a 5-point response scale. Section V, item 26 asked for agreement with the statement, "Much of what I know today about health and fitness I learned in Fitness for Life."

There was not a statistically significant difference in activity level based on the respondents' evaluation of the Fitness for Life course. The majority of students across the activity levels rated the course as average to good, with 42.5% rating the lecture portion of the course as average and 35.8% good, although 25.7% rated the activity portion average and 51.4% good. The response frequency distributions for the lecture and activity portions of Fitness for Life are reported in Tables 13 and 14.

While no item reached statistical significance, the item "much of what I know today about health and fitness I learned in fitness for life" approached significance and showed a trend toward the lower activity levels attributing more of their knowledge base to the Fitness for Life course than higher activity levels, $F(5,190) = 1.89$, $p = 0.098$.

The three variables were summed to create a Fitness for Life variable and revealed no difference between the activity levels with respect to evaluation of the Fitness for Life course. The null hypothesis is not rejected.

Research Question Seven - Do Differences Exist Between The Activity Levels In The Perception Of Health Benefits Related To Exercise Or Health Knowledge?

Hypothesis 11 and 12 were analyzed in response to this research question.

Hypothesis 11. There is no difference between the activity levels with respect to beliefs and benefits related to exercise. Activity level was analyzed in relation to beliefs and benefits by consideration of four items from Section V.

The four items asked for agreement with the statements, "I have a strong belief that exercise is good for me." "I do not need to exercise regularly for my own health and

TABLE 13

FREQUENCIES AND PERCENT OF RESPONSES TO FITNESS FOR LIFE LECTURES

| Evaluation Scale | Frequency | Percent |
|---|---|---|
| Poor | 6 | 3.3 |
| Fair | 29 | 15.9 |
| Average | 77 | 42.3 |
| Good | 66 | 36.3 |
| Excellent | 4 | 2.2 |
| Total | 182 | 100.0 |

TABLE 14

FREQUENCIES AND PERCENT OF RESPONSES TO FITNESS FOR LIFE ACTIVITIES SECTION

| Evaluation Scale | Frequency | Percent |
|---|---|---|
| Poor | 8 | 4.4 |
| Fair | 11 | 6.0 |
| Average | 48 | 26.4 |
| Good | 93 | 51.1 |
| Excellent | 22 | 12.1 |
| Total | 182 | 100.0 |

fitness." "Exercise does little to make me physically attractive." and "Physical activity is vitally important to me." Respondents who exercised at higher activity levels showed more agreement with the statements (items 11 and 24 were recoded) than those of lower activity levels. There was a statistically significant difference in activity level based on the respondents' belief that exercise is personally beneficial, $F(3,202) = 10.22$, $p = 0.001$; that exercise is beneficial for health and fitness, $F(4,201) = 3.48$, $p$ .009; that exercise contributes to physical attractiveness, $F(4,201) = 4.04$, $p = 0.004$; and that exercise is vitally important, $F(3,202) = 17.03$, $p = 0.001$.

Hypothesis 12. There is no difference between the activity levels with respect to health knowledge. Section V item 28 asks for agreement with the statement "I am very knowledgeable about fitness and exercise." Respondents who exercised at higher activity levels showed more agreement with the statement than those of lower activity levels. $F(4,201) = 2.89$, $p = 0.023$.

A new perceptions of health benefits variable was created by summing the five related items and those in higher activity levels rated health benefits significantly higher than those in low activity levels, $F(12,205) = 4.69$, $p = 0.001$. The null hypothesis was therefore rejected.

To determine if a relationship existed between high/low activity level and health benefits, a correlation coefficient was computed for the totaled health benefits variable. A significant correlation to high/low activity level was discovered ($r = 0.456$, $p = 0.001$).

Analysis by gender revealed a significant correlation to high/low activity level for both males ($r = 0.514$, $p = 0.001$) and females ($r = 0.424$, $p = 0.001$).

Further statistical analysis revealed that ratings on health benefits appeared to be related to activity level but not to gender. The mean for the high activity group (22.10) was 12.8% higher than the mean for the low activity group (19.58), $t(1,152) = 6.30$, $p = 0.001$, but the means for the men and women differed non-significantly by only 4.0% in the low active group and by 0.5% in the high active group. The two-way interaction was not significant (See figure 5).

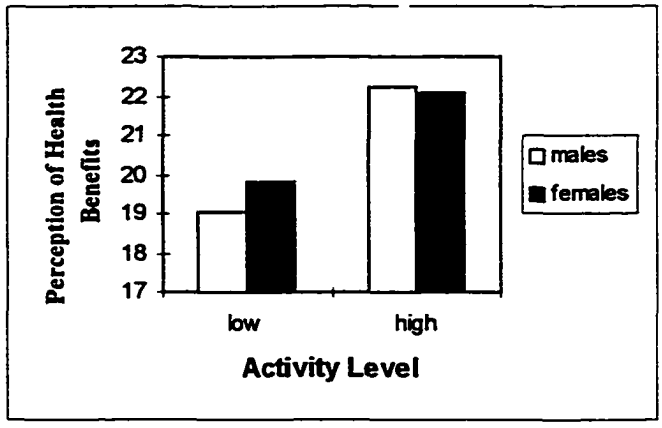



Figure 5. Rating for perception of health benefits by gender and activity level. High active > low active $F(1,152) = 39.72$, $p = 0.001$

Research Question Eight What Suggestions Were Presented By Both Groups To Improve The Exercise Environment At Milligan?

Hypothesis 13 was analyzed in response to this research question.

Hypothesis 13. There is no difference between activity levels with respect to suggestions to improve the exercise environment at Milligan. Section VI was used for analysis of this hypothesis.

Section VI of the MAA Questionnaire asked for response to the questions, "What specifically could be done at Milligan to encourage health and fitness habits?" and "What aspects of the Milligan environment encouraged you toward lifetime habits of health and fitness?" The responses were grouped into general categories, group frequencies were tallied, and statistical comparisons were computed between activity levels using the most frequent responses for the two questions as independent variables.

Although respondents were free to choose any area to suggest improvement at Milligan, two areas received a significant number of responses. Facility and equipment improvement was the most frequently cited suggestion and was mentioned in 88 surveys. Respondents recommended new facilities and equipment, better maintenance of existing equipment, different location for equipment, and more instruction in and supervision of equipment. The other frequently cited suggestion was the area of curriculum. Sixty- four respondents suggested offering more related courses, more variety of teaching methods, and more variety of times of courses.

When asked to cite those aspects of the Milligan environment that encouraged lifetime habits of health and fitness, the four most frequently cited areas were intramural

and intercollegiate sports, curriculum, faculty modeling, and encouragement of friends. Forty-two respondents listed the positives of intramurals as the variety of sports offered, the camaraderie experienced, or the break provided from academics. The 42 respondents who cited curriculum at Milligan as an encouragement mentioned Fitness for Life or several specific activity courses. Faculty modeling was listed by 33 respondents as providing positive encouragement and especially mentioned were instructors in the physical education faculty and others who exercise on campus during the lunch hour. A particular faculty member was cited four times as a negative in relation to quality of instruction. Friends were cited by 29 respondents as either encouraging through example or partnership in exercise. The complete response frequency distribution for each group is reported in Tables 15 and 16.

A statistical analysis of the most frequently occurring responses for the two questions was conducted to determine if there was a difference in activity level with respect to suggestions related to the exercise environment at Milligan as stated in hypothesis 13. The top two choices from question one and the top four choices from question two were analyzed because of the high frequency of responses to these choices. Of the six variables analyzed only two showed statistical significance. Respondents from higher activity levels listed facilities and equipment more often as a needed improvement than respondents from lower activity levels, $t(1,204) = 4.30$, $p = 0.004$. More active participants listed improved facilities as more of a need yet remained more active in spite of the poor facilities.

TABLE 15

RESPONSES TO FACTORS AT MILLIGAN THAT COULD BE IMPROVED TO ENCOURAGE HEALTH AND FITNESS HABITS

| Response | Frequency |
|---|---|
| Improve facility | 88 |
| Improve curriculum | 64 |
| Publicize | 14 |
| Improve cafeteria food | 12 |
| Improve intramurals | 9 |

TABLE 16

RESPONSES TO FACTORS AT MILLIGAN THAT ENCOURAGED LIFETIME HABITS OF HEALTH AND FITNESS

| Response | Frequency |
|---|---|
| Intramural or intercollegiate sport | 42 |
| Curriculum | 42 |
| Faculty modeling | 33 |
| Friend encouragement | 29 |
| Setting/weather | 18 |
| Equipment/facilities | 18 |

Respondents from higher activity levels cited intramural and intercollegiate sports significantly more often as encouragers to exercise than did respondents from lower activity levels, $t(1,205) = 4.30$, $p = 0.001$. Intramurals did receive several negative comments, the majority of which focused on a lack of organization during the transitional year to a new intramural director.

The two variables analyzed for question one were added to create a single variable to investigate a possible relationship with activity level. There was no statistically significant relationship between activity level and suggestions to encourage health and fitness.

The four variables analyzed for question two were added to create a single variable to investigate a possible relationship with activity level. Respondents from higher activity levels listed significantly more positive encouragers than did respondents from lower activity levels, $F(4,202) = 3.30$, $p = 0.00$ The null hypothesis is rejected.

The two individual responses that showed statistically significant differences in the means by activity levels were further analyzed. When the relationship was investigated, the indication of need for improved facilities and equipment was significantly correlated with high/low activity group for all participants ($r = 0.096$, $p = 0.015$), for males ($r = 0.199$, $p = 0.144$), and for females ($r = 0.204$, $p = 0.044$). Further statistical analysis revealed that facilities need was not significantly influenced by gender, but was significantly influenced by activity group. Women rated consistently higher, though non-significantly, the need for improved facilities and equipment than men. The mean for the low activity males (.321) was only 16.8% lower than the mean for females in the low activity group (.375); and for

the high activity group the mean for males (.518) was only 13.5% lower than the mean for females (.588).The mean for the high activity group (.557) was significantly higher than the mean for the low activity group (.358), $t(1,152) = 2.46$, $p$ 0.015.

When relationship of the second statistically significant response was investigated, intramural and intercollegiate sports as an encourager to exercise was significantly correlated with high/low activity group for all participants ($r = 0.294$, $p = 0.001$), for males ($r = 0.340$, $p = 0.021$), and for females ($r = 0.252$, $p = 0.012$). Further statistical analysis revealed that sports as an encourager to exercise was only influenced by gender for the total group where the male mean (0.304) was 123% higher than the female mean (0.136).

## Profile of the Active Adult as a Milligan Student

To create a picture of the active adult while a student at Milligan, the crosstabs statistical procedure was used to compare a newly created high and low activity group. Descriptions of the high activity group are made by comparing the percentage of that group that agrees or agrees strongly with an exercise principle with the percentage of the low activity group.

Students at Milligan who are likely to become active adults come to Milligan as regular exercisers 73.4% of the time, as compared with 35.5% for the low group. As the literature predicted, a higher percentage of the males than females fall in the high group with 49.1% of the males active as compared to 34.3% of the females. However, the gender gap is narrowing with increasing age.

This active group of students is confident in their physical abilities, as 65.0% perceive their skills and abilities as adequate to carry them through any chosen exercise program, compared with 37.7% of the low group. Only 13.3% of the active group see many sports and activities as too difficult, as compared with 41.9% of the low group. Good general fitness is a quality that 84.4% of the active group believe they posses as compared to 43.1% of the low activity group.

When choosing activities, the high activity group chooses more team sports through intramurals and intercollegiate sports and also more fitness activities than the low activity group and 70.0% of the active group considers their skill level as good to excellent as compared to 37.8% of the low group. Exercising at the vigorous intensity level is a characteristic of 58.3% of the high activity group compared to 17% of the low activity group.

Ninety percent of the high activity group looks forward to physical activity, compared to 56.5% of the low group, but 51.7% of the high group will continue exercising even if the exercise is not enjoyable, compared to 23.7% of the low group. Of the high group, 10.8% strongly agree that they would exercise even if a friend did not exercise, as compared to 1.7% of the low group.

The high activity group sees more positive encouragers toward exercise at Milligan, even though they understand better the need for better facilities and equipment as 58.3% considered the lack of equipment as a barrier compared to 29% of the low activity group. The statement that physical activity is vitally important drew strong agreement from 43.3% of the active population, but only from 12.9% of the low active

group, seems important. The picture of habit, confidence, ability, enjoyment, and participation emerges after analysis of the description of the Milligan student likely to become an active adult.

Assessment Of Those Variables That May Serve As Predictors Of Activity

Hypothesis 14. There is no relationship between the dependent variable and a combination of two or more independent variables. The statistical procedures conducted to this point in this study of exercise adherence allowed analysis of the influence on activity levels of various independent variables. Each independent variable can be seen influencing the dependent variable in a straight-line relationship. Multiple regression has as its purpose the explanation of as much of the variance in the value of the dependent variable as possible when the covariance of independent variables are considered (Burns & Grove, 1993). If the ANOVA relationship between an independent variable and the dependent variable is viewed as a straight line, in multiple regression, the relationship between several independent variables and the dependent variable is viewed as a concept.

In multiple regression, the independent variables are entered into the regression equation based on the amount of additional variance of the dependent variable explained by that variable. In this study, multiple regression was performed to ascertain which variables best predicted high activity level. Because activity level was significantly different by gender, a regression by gender was performed. Ten variables were considered for inclusion in each equation, based on the literature review and the univariate analysis of the data. After testing numerous combinations of the ten variables, those determined to give

the highest $R^2$ value for males were habit, fitness activities while at Milligan, self-efficacy, and number of individual sports while at Milligan. A variable entered the equation based on the largest partial correlation, provided that it was significant at the .05 level.

Table 17 lists the variables considered to obtain a multiple $R$ value of 0.6465 and the $R^2$ value of 0.4180, indicating approximately 42% of the variation in activity level could be explained by the combination of the selected variables for males. All of the variables were positively correlated, with the exception of the number of individual sports while at Milligan.

TABLE 17

MULTIPLE REGRESSION ANALYSIS OF ACTIVITY LEVEL FOR MALES

| Variable | Coefficient | s.e of Coefficient | t | Sig t |
|---|---|---|---|---|
| Fitness Activities at Millligan | 0.176 | 0.063 | 2.78 | 0.007* |
| Habit | 0.120 | 0.051 | 2.35 | 0.022* |
| Self-Efficacy | 0.074 | 0.035 | 2.08 | 0.041* |
| Individual Sports at Milligan | -0.138 | 0.067 | 2.04 | 0.045* |
| $R^2$ .42, $F$ =12.8 | | | | |

*$p < .05$

The coefficients indicate the relative contributions of the variables to the prediction of activity level. From Table 17, it is evident that the greatest influences on males are

fitness activities while at Milligan and individual sports at Milligan, followed by habit and self-efficacy.

From the data obtained in the multiple regression calculation, a prediction formula was developed into which the values for each variable may be inserted resulting in a numerical score for each subject. The resultant score for each male subject in the prediction formula is between 1 and 5 and gives an estimation of the predicted activity level for each subject, with 1 being low and 5 high. Using the constant and the coefficients for the predictor variables from the multiple regression gives the following formula:

Activity Level for Males= (0.12) Habit + (0.17) Fitness Activities at Milligan + (0.07) Self-efficacy - (0.14) Individual Sports at Milligan.

For females, numerous combinations of the same 10 variables were tested. Those determined to give the highest $R^2$ value for females were habit, enjoyment, and fitness activities while at Milligan. A variable entered the equation based on the largest partial correlation, provided that it was significant at the .05 level. Table 18 lists the variables considered to obtain a multiple $R$ value of 0.643 and the $R^2$ value of 36.3, indicating approximately 36% of the variation in activity level for females could be explained by the combination of the selected variables. All of the variables were positively correlated.

TABLE 18

MULTIPLE REGRESSION ANALYSIS OF ACTIVITY LEVEL FOR FEMALES

| Variable | Coefficient | s.e of Coefficient | t | Sig t |
|---|---|---|---|---|
| Habit | 0.192 | 0.038 | 5.06 | 0.001* |
| Enjoyment | 0.124 | 0.058 | 2.18 | 0.031* |
| Fitness Activities at Millligan | 0.091 | 0.038 | 2.41 | 0.018* |
| $R^2$ .36, $F$ =23.5 | | | | |

*$p < .05$

The coefficients indicate the relative contributions of the variables to the prediction of activity level. From Table 18 it is evident that the greatest influences on females are habit and enjoyment, followed by fitness activities while at Milligan.

From the data obtained in the multiple regression calculation, a prediction formula was developed for females into which the values for each variable may be inserted resulting in a numerical score for each subject. The resultant score for each female subject in the prediction formula is between 1 and 5 and gives an estimation of the predicted activity level for each subject with 1 being low and 5 high. Using the constant and the coefficients for the predictor variables from the multiple regression produces the following formula:

Activity Level for Females= (0.19) Habit + (0.09) Fitness Activities at Milligan + (0.12) Enjoyment.

Two new models, one for males and one for females, depicting the findings based on the literature review and the statistical findings of this study, are presented in Figures 6 and 7. The four variables used in the prediction equation for males and the three for females are viewed as primary and interrelated in determining exercise behavior. The weaker determinants are viewed as influencing exercise adherence through their effects on the primary determinants, which more strongly influence exercise adherence.

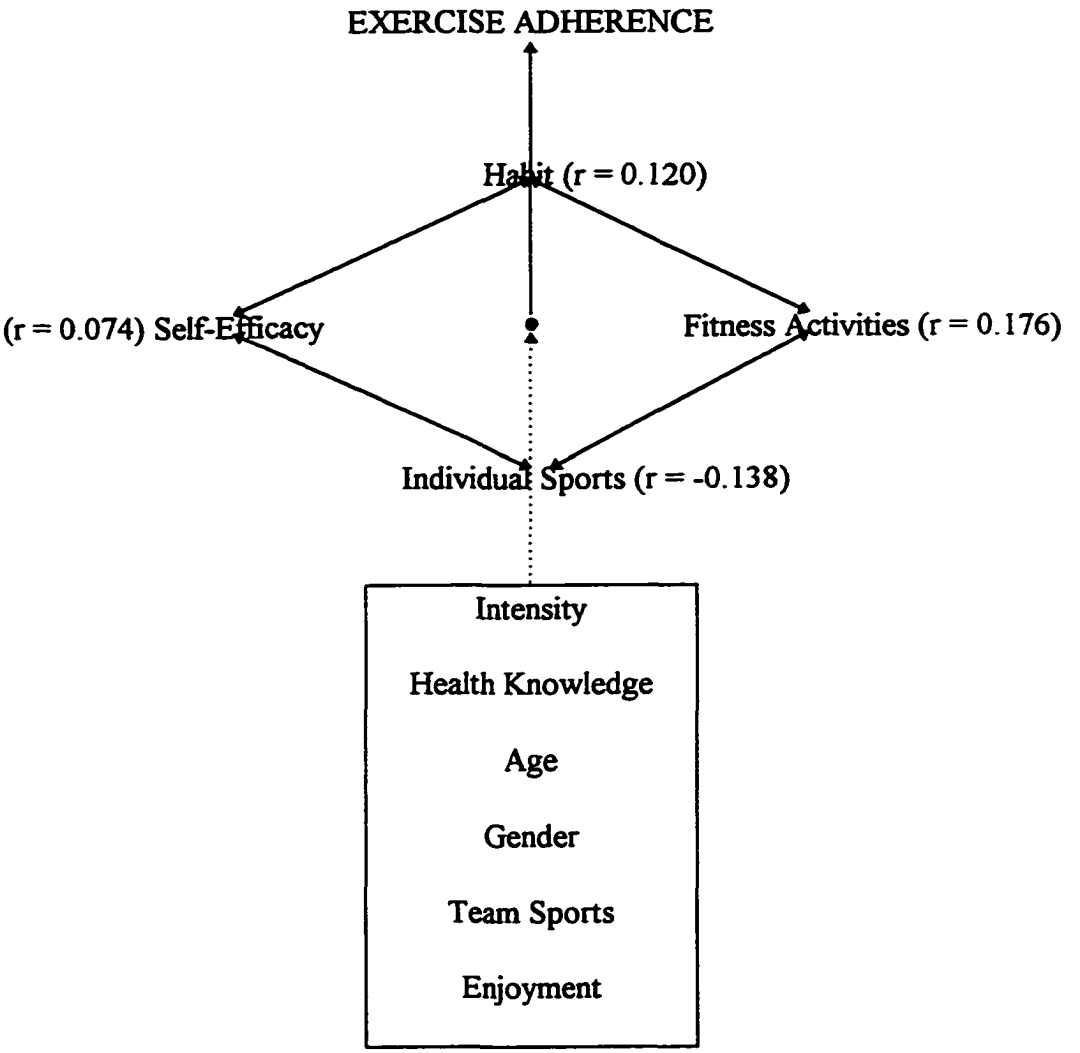



Figure 6. Revised relationship of independent variables to dependent variable of exercise adherence for males.

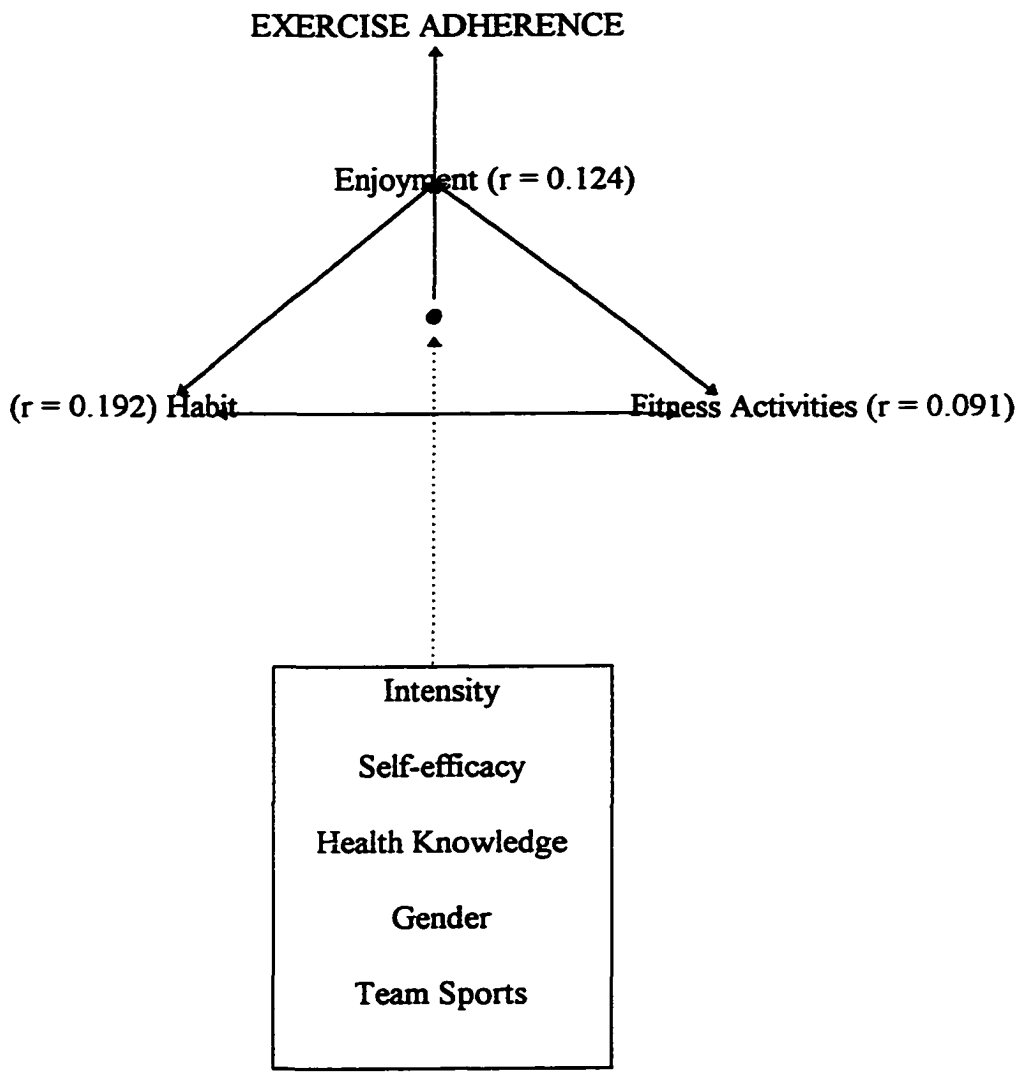



Figure 7. Revised relationship of independent variables to dependent variable of exercise adherence for females.

# CHAPTER 5

# SUMMARY, FINDINGS, AND RECOMMENDATIONS

The many subtle forces that impact exercise adherence manifest themselves differently throughout the life span. This study examined factors present during the college experience thought to predict adult fitness levels. The purpose of this chapter is to present a summary of the study with reference to existing research and theory, to identify the significant findings, to make recommendations for further research, and to suggest recommendations for professional practice at Milligan College.

## Summary

As expected from the survey of literature, male gender was positively correlated with higher activity level. This correlation was strongest at the high and low ends of the activity levels, as the lowest activity group contained a percentage value more than three times as high for women as men, although the highest activity group contained a percentage value more than three times as high for men as women. The middle three activity levels were more homogenous in response. The findings of this study are in agreement with the majority of the literature reviewed related to gender. Several studies cited evidence of vigorous activity correlating with male gender (Sallis et al., 1986; Stephens et al., 1985; Treiber et al., 1991), and the only study that showed male gender

negatively correlated with activity (Hovell et al., 1989) dealt only with non-vigorous walking.

The literature review showed weak positive correlations between income level and activity level, but this study did not show that same correlation. Although several studies cited evidence that economic status can be a determinant of activity (Andrew et al., 1981; Butcher, 1983; Cauley et al., 1991), the lack of evidence from this study does not present a strong case against socioeconomic status as a determinant of activity level. Most subjects in this study were at the same basic socioeconomic level, as all were recent college graduates of the same institution. Because Milligan College is a private Christian liberal arts college, there was also a homogeneity of socioeconomic background not found in a true random sample.

Physical self-efficacy revealed a significant relationship with activity as it was analyzed through the responses to six questions on the MAA Questionnaire. The rating of general fitness was the variable that presented the highest correlation to activity level. It is logical to assume that the more fit an individual believes him/herself to be, the more activity the individual will chose to undertake, and the lower the perception of fitness, the less activity. Each study presented in the literature review found self-efficacy to be a significant correlate of physical activity. The studies of Hovell et al. (1989), Reynolds et al. (1990), and Sallis et al. (1986; 1989), showed self-efficacy to be the strongest correlate of exercise.

This study considered self-efficacy by gender and found that while self-efficacy correlated to activity level for both males and females, males were also found to have

higher self-efficacy scores in all but the lowest of the five activity levels. This reversal in the lowest activity level may indicate that lower level activity is more easily accepted and less related to self-esteem for females than it is for males. The highest activity level revealed the least difference in self-efficacy by gender, perhaps indicating that vigorous exercisers work hard and feel high levels of self-satisfaction regardless of gender.

Enjoyment of activity showed the positive correlation predicted by each of the seven studies reviewed previously, in that both males and females who were more active enjoyed exercise more. An interesting finding that contradicted the studies of Sallis et al. (1989) and Slenker et al. (1984) showed that enjoyment was not a necessary component to exercise, as those who were more active were more able to exercise even if the activity itself was not enjoyable. Although enjoyment is tied to exercise the association may be a benefit that the active person receives rather than just a source of motivation. Enjoyment may also be associated with self-efficacy, as it is likely that things a person does well are more likely to be enjoyed.

Habit was a strong predictor of activity level for both males and females as revealed through multiple regression. Those who were more active were more often lifetime exercisers who more often continued in an exercise program for longer than six months. This finding supports the research of Dishman (1985) and Oldridge (1982), which showed higher levels of maintenance of activity for those who were able to adhere to exercise programs for longer than three to six months. This study also revealed those from higher activity levels viewed themselves as exercising more than others in their age group, which would give strength not only to the habit variable but also perhaps to the self-

efficacy variable. A person who perceives himself/herself to be a more frequent exerciser than others, will likely view that as an enabling positive.

Intensity level was revealed to be significantly linked to activity level and was in agreement with that literature that studied a population of similar age. Although the literature in general concludes that moderate activity is correlated with high activity levels, this correlation related most strongly to women and those over age 50. Sallis et al. (1989, 1992) found a general decrease in intensity level of vigorous or moderate activity with increased age. The current study did not address intensity level over a long period of time, but rather showed correlation between a higher intensity level of exercise with a higher activity level. Because this was a relatively young adult population, this finding was not unexpected. A decrease in activity intensity from the time at Milligan to the relatively short one-to-three year period after graduation supported the idea that exercise intensity decreases with increased age even among those who were more active. It is interesting to note that the less active also became less active at a lower intensity from the time at Milligan to the time after Milligan, as both males and females in the at Milligan low level activity groups decreased their intensity of exercise by higher percentages than those in the high level activity groups. Perhaps lack of exercise habit and the increased difficulty of scheduling exercise after graduating from college contribute to this continuing downward spiral of activity and intensity levels over time. Intensity level was also related to gender as males exercised at higher intensity levels than females. This was in agreement with the Sallis et al. (1982) study, which showed that younger adults and males tend to exercise at higher levels than older adults and females. This correlation between males and higher

intensity level may help explain the higher correlation between males and self-efficacy than females and self-efficacy. As adults age, they choose more moderate activity levels (Sallis et al., 1986; 1989).When comparisons were made between intensity level and gender at Milligan and after Milligan, it was found that females showed less of a decrease in intensity level with time than did males. This supports the trend revealed by studies cited in the literature review (Canada Fitness Survey, 1983; Sallis et al., 1986) that showed the gap between intensity level of exercise narrowing with age. Even in the one to three years post graduation from Milligan these trends were evident, as women, who more often choose moderate activities (Sallis et al., 1986), were found in this study to be exercising at a relatively higher level than men when compared to pre-graduation levels. This is in agreement with the concept implied in the Canada Fitness Survey (1983) that males and females may change their exercise habit rates differently as they age.

Participation in sports and fitness activities was related to activity level. Activity level was only influenced by individual sports participation during the after Milligan time period. The traditional definition of athlete assumes participation in the more familiar team sports. A possible explanation for a lack of association with individual sports at the younger two time periods is that several of the individual sports listed, such as ping pong, golf, and badminton, are considered very low intensity and participation might not impact activity level. Also, such sports such as alpine skiing, wrestling, track and field, gymnastics, and swimming and diving are seasonal or require assistance and, therefore, might not impact selection of activity level for the one year period specified in Section I of the MAA Questionnaire. Participation in team sports was most influential during the

college years, while the influence of participation in fitness activities increased across the time spans examined. The lack of influence of fitness activities on activity level in youth was understandable, because of the low organization and non-competitive nature of the activities. As youth mature into young college-aged adults, fitness activities gain prominence as health and fitness become the goal and competition and organization become less important. After college, fitness activities showed the strongest relationship to activity level, even when compared to team sports. It is expected that as the respondents continue to age and team sports become less available, fitness activities will continue. to show the strongest relationship to activity level. Habit, which has been cited as influential on activity level, may also contribute to the strength of this variable, especially during the at and after Milligan time periods.

Although team sports, individual sports, and fitness activities impact activity level differently at the three different time periods, there was difference between exercise groups with respect to sports and fitness activities. Sports participation was only correlated to adult activity level in the literature review when studying young male subjects (Dennison et al., 1988). Because the availability of team sports diminishes with time, especially after leaving college, the findings that sports was most influential during the college years and that fitness activities become more influential with time seem logical. The Dennison et al. (1988) study that surveyed a population similar to the population in this study (ages 23-25) did show a correlation of present activity levels with athletic performance in high school. The results of the Brill et al. (1989) and Dishman (1988) studies that dealt with older adult populations did not show correlation with activity levels

and past team sport participation. This may indicate that team sport participation has a waning influence on adult activity level as adults age. The present study cannot address the question of later adulthood, but can conclude that team sports participation as youth, while at Milligan, and after graduation from Milligan is associated with higher activity levels.

The area of this study that showed the least agreement with the literature review was social influence. There was no correlation among any of the three social influences of (a) preference to exercise with a group or friend, (b) family support of exercise, (c) and having friends who enjoy similar kinds of exercise and activity level. The only relationship that showed a statistical significance revealed a negative correlation between friend influence and activity level with those who are more active more likely to exercise even if a friend did not. Although this variable may be more related to determination to exercise on the part of those more active, it may also show a lack of importance of friend influence.

An explanation of these findings may be related to the age group studied. Recent college graduates are in groups socially dissimilar from any previous time. Parental influences have waned as financial, social, and geographic independence have often been reached. Peer groups that were so readily available in college are slower to form as the potential pool of friends is smaller and free time for the newly employed is more scarce. The study did not show that family friends were not important, but that social influence was not a characteristic of the active group more than the less active group. Social influence did show a relationship to self-efficacy, so while a direct relationship between social influence and activity level was not present, there was an indirect influence exerted

by the variable through the stronger variable, self-efficacy. The findings of this study are not in agreement with the majority of the literature. The only study that did not show correlation between activity level and social influence was that of Duncan and McAuley (1993). One explanation for this disagreement is related to the age of the respondents in this study, as the average age of the respondents was 25.4 years and the median age was 24 years. All previous studies investigating social influence on activity level were of older or younger populations with the exception of the Dennison et al. (1988) study. Although the Dennison et al. (1988) study did show correlation between social support and activity level for this age group, it analyzed spousal support, which this study did not specifically address. Several studies investigated sedentary middle-aged males, or cardiac patients and specifically studied spousal support (Andrew et al., 1981; Heinzelmann and Bagley, 1970). Other studies dealt with a random adult population and looked at specific types of family influence, such as father's participation in sports, and parents' support and encouragement to exercise (Butcher, 1983; Hovell et al., 1989; Sallis et al., 1989, 1992). In several of these studies gender or marital status was related to social influence. An attempt was made to explore the effect of gender or marital status on social influence and no significant differences were found.

This study did not find barriers to exercise significantly related to activity level, but did find that those who are more active, realize more acutely the need for quality equipment and facilities, as did several studies in the literature review (Butcher, 1983; Sallis et al., 1989; 1990; Stephens et al., 1985). Although there was no overall statistical significance relative to barriers, several individual barriers did reveal statistical significance

and indicated that those who are less active view more items as barriers than do those who are more active.

Females at Milligan was the only gender and time period that listed more barriers, though not significantly more, for the high activity group than the low activity group. Less active males at Milligan and less active males and females after Milligan all chose significantly more barriers than their respective more active counterparts. These findings can indicate one of two things: (a) those from lower activity levels not only perceive more items as barriers to exercise but also allow those barriers to prevent activity or (b) those from lower activity levels choose to not exercise for reasons other than barriers, but perceive barriers as preventing them from exercise. This analysis cannot determine which of these reasons is more accurate. This might lead to the conclusion that the barriers are more perceptions of barriers than actual barriers to physical activity.

That less active males at Milligan and less active males and females after Milligan selected the most barriers for those time periods supports the finding that males and females do not perceive barriers differently. That each gender and activity level after Milligan was higher than its respective at Milligan barrier count reflects the change in lifestyle and increased distance to facilities that increase the number of barriers presented and especially reflects the findings of the studies of Sallis et al. (1990) and Andrew et al. (1981).

The Fitness for Life course was not viewed differently by the different activity levels with the majority of all groups rating the program as average to good. This leads to the assumption that Fitness for Life was not a primary source of health and fitness

knowledge when considering the overall aptitude for health and fitness. Although no single item related to Fitness for Life reached statistical significance, the item "much of what I know today about health and fitness I learned in Fitness for Life" approached significance and showed a trend toward the lower activity levels attributing more of their knowledge base to the Fitness for Life course than higher activity levels. It is possible that the respondents from the lower activity levels begin with a smaller base of knowledge than those from higher activity levels. If this is true, it is likely that more of their present health knowledge comes from Fitness for Life than those from the higher activity levels. Fitness for Life did appear more often as a positive than as a negative in the subjective analysis of the Milligan exercise environment in all the activity levels.

Health knowledge gained through various avenues, and beliefs and benefits of exercise of health knowledge were statistically significant variables. The literature review was not conclusive. One study linked knowledge about health benefits to lifestyle activities but not to vigorous actives (Sallis et al., 1986), but another study reported health benefit beliefs unrelated to regular exercise or fitness (Slenker et al., 1984) and several studies saw knowledge of health benefits as positive influences on exercise (Kendzierski and DeCarlo, 1991; Sallis et al., 1992; Steinhardt and Dishman., 1989). It is interesting to note that although there were differences, the majority of all respondents did agree with the statements related to the benefits of exercise and health knowledge with the difference coming in the strength of the agreement. It might be concluded that although most people agree that exercise is beneficial for health and fitness, those who choose to be active take their agreement to a level strong enough to produce action. A question that must be asked

is whether the belief leads to the activity or the activity leads to the belief. This study cannot definitively conclude that answer.

To improve the exercise environment at Milligan, facilities and equipment were most often suggested although intramural and intercollegiate sports, curriculum, faculty modeling, and friend encouragement were most often suggested as positives at Milligan for encouraging exercise. Respondents from higher activity level realized a greater need for improved equipment and facilities than respondents from lower activity levels and also found more encouragement to exercise while at Milligan than respondents from lower activity levels. Perhaps more active individuals better understand the need for quality equipment and although the lack of it might not deter exercising, the desire for improved equipment and facilities is viewed as a way to improve the exercise environment.

## Significant Findings

1. Male gender is a factor in determining activity level, as males more often are more active than females and active at a higher intensity level than females.

2. Socioeconomic level is not a factor in this study, perhaps because of the homogeneity of income of the majority of respondents.

3. Exercise self-efficacy, enjoyment of exercise, and habit each lead to higher activity levels for males and females, and each area is strong enough to serve as a predictor of activity level

4. Higher intensity level of exercise is a factor in determining higher activity levels and, while males exercise at higher intensity levels than females, the highest level exercisers show the least gender differences.

5. Graduates from higher activity levels were active in more team sports as young people, more team sports and more fitness activities while at Milligan, and more team sports, individual sports, and fitness activities after leaving Milligan than were graduates from lower activity levels.

6. Social influences and the perception of barriers to exercise are not factors in determining activity level for this age group.

7. Health beliefs and valuing health benefits influence activity level. While the majority of young adults value health beliefs and health knowledge, those who are more active take their belief to a strong enough level to produce action.

## Recommendations for Further Research

Research is not an end in itself. Answering one question leads to the asking of several new questions. The research on exercise adherence related to the college population generated questions that warrant additional study.

The focus of this study was a very specific Milligan College population. Outside the scope of this analysis are young people from different settings. Study of this age group at institutions other than a small private Christian liberal arts college in Tennessee as well as those not attending any college would allow a comparison of results that would permit broader conclusions.

In the analysis of social influence, this study made unclear the definition of family influence. Further research that defined family influence as influence of parents, spouse, or children at specific time periods would permit a clearer analysis. Further inquiry into the

types of peer groups available and chosen would also permit a more clear picture of social influence.

This study revealed a narrowing gap between gender differences and activity level with increasing age. Further study following this specific population into the future would provide data to determine the validity of this trend.

Intensity level of exercise was described as vigorous more often for those respondents in high activity levels than for those in low activity levels, but no quantitative definition of vigorous intensity was presented. Further research into specific intensity levels with quantifiable limits would permit better descriptions of the distinction between intensity levels at the various activity levels.

A similar follow-up study conducted in 5-10 years would allow the researcher to view the longer term effects of the Milligan exercise environment as influential in later adult exercise habit.

## Implications for Professional Practice

Recent changes have been made at Milligan College in an effort to enhance the exercise environment. A new major field of study, Human Performance and Exercise Science, has as one of its goals the development of health and wellness for the campus community. Within this new curriculum are several new courses specifically related to health and wellness. Within this new curriculum the opportunity to evaluate effectiveness of the exercise structure and environment at Milligan is included in several courses. The position of Intramural Director has been upgraded to Director of Campus Wellness and is a higher salaried position than in the past. These facts, coupled with the knowledge gained

from this study, serve to shed positive light on the future of the exercise environment at Milligan College.

The only barrier that proved statistically significant for the at Milligan time period was poor equipment and facilities, with those from higher activity levels listing this more often as a barrier to exercise. Milligan has improved exercise equipment with the addition of a quality weight room and the addition of several pieces of exercise equipment. Although these improvements are helpful, the problem still needs more attention. In addition to new facilities and equipment, better maintenance of existing equipment and more convenient equipment locations are also recommended. The administration is urged to study methods to procure funds to continue to improve the facilities and equipment to the point that equipment becomes a motivation to exercise, rather than a barrier to exercise.

Because of the importance of exercise self-efficacy, efforts should be made to provide trained personnel to assist and encourage proper use of exercise equipment. Work-study positions employing majors in the newly created Human Performance and Exercise Science field chould be utilized. A more efficient use of equipment would be possible if training in equipment use and a means of record keeping were available to equipment users.

Sports participation, especially through intramurals, provided positives from both the subjective evaluation of the exercise environment at Milligan and the statistical analysis. Attention to development of more intramural programs offering a greater variety of sports of varying ability levels will enhance the role of intramurals in encouraging

exercise. Noncompetitive intramural programs encouraging use of exercise equipment and other fitness activities also need further development.

Campus informal organization of walking, biking, hiking, weight training, and other similar activities will encourage development of exercise habits. Work-study students can provide group structure. Credited internships from the area of Human Performance and Exercise Science would be valuable means of structuring these groups while exposing students and faculty alike to more avenues of exercise. With the emphasis shift from team sports to fitness activities as young people leave the college world, a greater emphasis on fitness activities while in college would provide the beginnings of habits that would hopefully last for a lifetime.

The Fitness for Life course needs to be reevaluated with regard to teaching methods and exercise opportunities. Recent positive changes in the course were not reflected in this study. Small group activities have been implemented into the lecture portion of the course that might satisfy the suggestion for variety of teaching methods. More activities offered during non-morning hours, a greater variety of activities, and other improvements can be addressed by the teaching faculty for Fitness for Life.

## The Researcher's Overall Impressions and Conclusions

The importance of the college environment for determining adult fitness habits has been emphasized throughout this study. Any inroads in encouraging exercise adherence in this, the last formal setting before older adulthood, can improve the likelihood of long-term activity patterns that may add both quality and quantity to life. With the data analysis presented through this study, and the willingness of the faculty and staff at Milligan College to make a difference in the lifetime habits of their students, significant gains for exercise adherence are possible.

# REFERENCES

# REFERENCES

Anderssen, N., & Wold, B. (1992). Parental and peer influences on leisure-time physical activity in young adolescents. Research Quarterly for Exercise and Sport, 63, 341-348.

Ajzen, I. (1985). From intention to actions: A theory of planned behavior. In J. Kuhl and J. Beckmann (Eds.), Action-control: From cognition to behavior (pp. 11-39). Heidelberg: Springer.

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice Hall.

American College of Sports Medicine. (1990). The recommended quality and quantity of exercise for developing and maintaining fitness in healthy adults. Medicine and Science in Sport and Exercise, 22, 265-274.

Andrew, G.M., Oldridge, N.B., Parker, J.O., Cunningham, D.A., Rechnitzer, P.A., Jones, N.L., Buck, C., Kavanagh, T., Shephard, R.J., & Sutton, J.R. (1981). Reasons for dropout from exercise programs in post-coronary patients. Medicine and Science in Sports and Exercise, 13, 164-168.

Bandura, A. (1982). Self-efficacy mechanism in human agency. American Psychologist, 37, 122-147.

Bandura, A. (1992). Exercise of personal agency through the self-efficacy mechanism. In R. Schwarzer (ed.), Self-efficacy: Thought control of action. Washington: Hemisphere.

Blair, S.N. (1993). Physical activity, physical fitness, and health. Research Quarterly for Exercise and Sport, 64, 365-376.

Blair, S.N., Kohl, H.W., Paffenbarger, R.S., Clark, D.G., Cooper, K.J., & Gibbons, L.W. (1986). Physical fitness and all-cause mortality. Journal of the American Medical Association, 262, 1395-1401.

Brill, P.A., Burkhalter, H.E., Kohl, H.W., & Blair, S.N.(1989).The impact of previous athleticism on exercise habits, physical fitness, and coronary heart disease risk factors in middle-aged men. Research Quarterly for Exercise and Sport, 60, 209-215.

Butcher, J. (1983). Socialization of adolescent girls into physical activity. Adolescence, 18, 753-766.

Burns, N., & Grove, S.K. (1993). The practice of nursing research. Philadelphia: W.B. Saunders.

Canada Fitness Survey (1983). Fitness and lifestyle in Canada. Fitness Canada, Ottawa.

Caspersen, C.J. (1987). Physical inactivity and coronary heart disease. Physician Sportsmedicine, 15, 43-44.

Cauley, J.A., Donfield, S.M., Laporte, R.E., & Warhftig, N.E. (1991). Physical activity by socioeconomic status in two population based cohorts. Medicine and Science in Sports and Exercise, 23, 343-352.

Courneya, K.S., & McAuley, E. (1994). Factors affecting the intention-physical activity relationship: Intention verses expectation and scale correspondence. Research Quarterly for Exercise and Sport, 65, 280-285.

Dennison, B.A., Straus, J.H., Mellits, E.D., & Charney, E. (1988). Childhood physical fitness tests: Predictor of adult physical activity levels? Pediatrics, 82, 324-330.

Dishman, R.K. (1982). Compliance/adherence in health-related exercise. Health Psychology, 1, 237-267.

Dishman, R.K. (1985). Exercise adherence and habitual physical activity. In W.P. Morgan & S.M. Goldston (Eds.). Coping with mental stress: The potential and limits of exercise intervention. Rockville, MD: National Institute of Mental Health.

Dishman, R.K. (Ed.). (1988a). Exercise adherence: Its impact on public health. Champaign, IL: Human Kinetic Books.

Dishman, R.K. (1988b). Supervised and free-living physical activity: No differences in former athletes and nonathletes. American Journal of Preventative Medicine, 4, 153-160.

Dishman, R.K., Sallis, J.F., & Orenstein, D.R. (1985). The determinants of physical activity and exercise. Public Health Reports, 100, 158-170.

Dishman, R.K., & Steinhardt, M. (1988). Reliability and concurrent validity for a 7-d recall of physical activity in college students. Medicine and Science in Sports and Exercise, 20, 14-25.

Dishman, R.K., & Steinhardt, M. (1990). Health locus of control predicts free-living, but not supervised, physical activity: A test of exercise-specific control and outcome-expectancy hypotheses. Research Quarterly for Exercise and Sport, 61, 383-394.

Duncan, T.E., & McAuley, E. (1993). Social support and efficacy cognitions in exercise adherence: A latent growth curve analysis. Journal of Behavioral Medicine, 16, 199-219.

Dzewaltowski, D.A. (1994). Physical activity determinants: A social cognitive approach. Medicine and Science in Sports and Exercise, 26, 1395-1399.

Friedenreich, C.M., & Rohan, T.E. (1995). Physical activity and risk of breast cancer, European Journal of Cancer Prevention, 4, 145-151.

Gatch, C.L., & Kendzierski, D. (1990). Predicting exercise intentions: The theory of planned behavior. Research Quarterly for Exercise and Sport, 61, 100-102.

Godin, G. (1987). Importance of the emotional aspect of attitude to predict intention. Psychological Reports, 61, 719-723.

Godin, G. (1994 a). Theories of reasoned action and planned behavior: Usefullness for exercise promotion. Medicine and Science in Sports and Exercise, 26, 1391-1394.

Godin, G. (1994 b). Social-cognitive models. In R.K. Dishman (Ed.), Advances in exercise adherence. Champaign, IL: Human Kinetic Books.

Greendorfer, S.L. (1983). Shaping the female athlete: The impact of the family. In M. Boutslier & L. San Giovani (Eds.), The sporting woman. Champaign, IL: Human Kinetics Publishers.

Heinzelmann, F., & Bagley, R.W. (1970). Response to physical activity programs and their effects on health behavior. Public Health Reports, 85, 905-911.

Helmrich, S.P., Ragland, D.R., & Paffenbarger, R.S. (1994). Prevention of non-insulin-dependent diabetes mellitus with physical activity. Medicine and Science in Sports and Exercise, 26, 824-830.

Hinkle, D.E., Wiersma W., & Jurs, S.G. (1994). Applied statistics for the behavioral sciences. Boston: Houghton Mifflin.

Hovell, J.F., Sallis, J.F., Hofstetter, C.R., Spry, V.M., Faucher, P., & Caspersen, C.J. (1989). Identifying correlates of walking for exercise: An epidemiologic prerequisite for physical activity promotion. Preventive Medicine, 18, 856-866.

Howley, E.T., & Franks, B.D. (1986). Health/fitness instructor's handbook. Champaign, IL: Human Kinetics.

Kemper, J.C.G. (1994). The natural history of physical activity and aerobic fitness in teenagers. In R.K. Dishman (Ed.), Advances in exercise adherence. Champaign: IL, Human Kinetics.

Kendzierski, D., & DeCarlo K.J. (1991). Physical activity enjoyment scale: Two validation studies. Journal of Sport and Exercise Psychology, 13, 50-64.

Mullen, P.D., Hersey, J.C., & Iverson, D.C. (1987). Health behavior models compared. Social Sciences and Medicine, 24, 973-981.

Oldridge, N.B. (1982). Compliance and exercise in primary and secondary prevention of coronary heart disease: A review. Preventative Medicine, 11, 56-70.

Overman, S.J., & Rao, V.V. (1981). Motivation for and extent of participation in organized sports by high school seniors. Research Quarterly for Exercise and Sport, 52, 228-237.

Paffenbarger, R.S., Hyde, R.T., Wing, A.L., & Hsieh, C.C. (1986). Physical activity, all-cause mortality, and longevity of college alumni. New England Journal of Medicine, 314, 605-613.

Perlmutter, S. (1996). Surgeon general's report on physical activity and health. Washington. President's Council on Physical Fitness and Sports.

Reynolds, K.D., Killen, J.D., Bryson, S.W., Maron, D.J., & Farquhar, J.W. (1990). Psychosocial predictors of physical activity in adolescents. Preventive Medicine, 19, 541-551.

Rosenstock, I.M. (1974). Historical origins of the health belief model. Health Education Monographs, 2, 328-335.

Rosenstock, I.M. (1990). The health belief model: Explaining health behavior through expectancies. In K. Glanz, F.M. Lewis, & B.K. Rimer (Eds.) Health behavior and health education: Theory, research, and practice. San Francisco: Jossey-Bass.

Sallis, J.F. (1982). Unpublished observations, November 18, 1982. In R.K. Dishman, James, F. Sallis, D.R. Orenstein. The determinants of physical activity and exercise. Public Health Reports, 100, 158-171.

Sallis, J.F., Hovell, M.F., & Hofstetter, C.R. (1992). Predictors of adoption and maintenance of vigorous physical activity in men and women. Preventative Medicine, 21, 237-251.

Sallis, J.F., Haskell, W.L., Fortmann, S.P., Vranizan, K.M., Taylor, C.B., & Solomon, D.S. (1986). Predictors of adoption and maintenance of physical activity in a community sample. Preventative Medicine, 15, 331-341.

Sallis, J.F., Hovell, M.F., Hofstetter, C.R., Faucher, P., Elder, J.P., Blanchard, J., Caspersen, C.J., Powell, K.E., Christenson, G.M. (1989). A Multivariate study of determinants of vigorous exercise in a community sample. Preventative Medicine, 18, 20-34.

Sallis, J.F., Hovell, M.F., Hofstetter, C.R., Elder, J.P., Hackley, M., Caspersen, C.J., & Powell, K.E. (1990). Distance between homes and exercise facilities related to frequency of exercise among San Diego residents. Public Health Reports, 105, 179-185.

Slavin, R.E. (1986, July). Best-evidence synthesis: An alternative to meta-analytic and traditional reviews. Educational Researcher, 5-11.

Slenker, S.E., Price, J.H., Roberts, S.M., & Jurs, S.G. (1984). Joggers versus nonexercisers: An analysis of knowledge, attitudes, and beliefs about jogging. Research Quarterly for Exercise and Sport, 55, 371-378.

Sonstroem, R.J., & Walker, M.I. (1973). Relationship of attitudes and locus of control to exercise and physical fitness. Perceptual and Motor Skills, 36, 1031-1034.

Steinhardt, M.S., & Dishman, R.K. (1989). Reliability and validity of expected outcomes and barriers for habitual physical activity. Journal of Ocuupational Medicine, 31, 536-546.

Stephens, T., Jacobs D.R., & White, C.C. (1985). A descriptive epidemiology of leisure-time physical activity. Public Health Reports, 100, 147-157.

Treiber, F.A., Baranowski, T., Braden, D.S., Strong, W.B., Levy, M., & Knox, W. (1991). Social support for exercise: Relationship to physical activity in young adults. Preventative Medicine, 20, 737-750.

Triandis, H.C. (1977). Interpersonal behavior. Monterey, CA: Brooks/Cole.

United States Department of Health and Human Services. Public Health Service. (1981). Health risk appraisals: An inventory. Washington, DC: National Health Information Clearinghouse.

United States Department of Health and Human Services. Public Health Service. (1991). Healthy people 2000: National health promotion and disease prevention objectives. Washington, D.C.: National Health Information Clearinghouse.

Wallston, K.A. (1994). Theoretically based strategies for health behavior change. In M.P. O'Donnell & J.S. Harris (Eds.), Health promotion in the workplace. Albany, NY: Delmar.

Wallston, B.S., Wallston, K.A., Kaplan, G.D., & Maides, S.A. (1976). Development and validation of the health locus of control (HLC) scale. Journal of Consulting and Clinical Psychology, 44, 580-583.

Wallston, K.A., Wallston, B.S., & DeVellis, M.R. (1978). Development of a multi-dimensional health locus of control (MHLC) scale. Health Education Monographs, 6, 161-170.

Wankel, L.M. (1984). Decision-making and social-support strategies for increasing exercise involvement. Journal of Cardiac Rehabilitation, 4, 124-135.

Wier, L.T., Jackson, A.S., & Pinkerton M.B. (1989). Evaluation of the NASA/JSC health-related fitness program. Aviation, Space, and Environmental Medicine, 60, 438-444.

Young, D.R., & Steinhardt, M.A. (1993). The importance of physical fitness versus physical activity for coronary artery disease risk factors: A cross-sectional analysis. Research Quarterly for Exercise and Sport, 64, 377-384.

# APPENDICES

# APPENDIX A

# MILLIGAN ALUMNI ACTIVITY SURVEY

# *MILLIGAN ALUMNI ACTIVITY SURVEY*

## Section I

**PHYSICAL ACTIVITY QUESTIONNAIRE**

**Please check ONE category below (0-10) that best describes your overall physical activity for the previous year:**

___0 = avoid walking or exertion; e.g., always use elevator, drive when possible instead of walking.
___1 = walk for pleasure, routinely use stairs, occasionally exercise sufficiently to cause heavy breathing or perspiration
___2 = moderate activity; 10 to 60 minutes per week of moderate activity, such as golf, horseback riding, calisthenics, table tennis, bowling, weightlifting, yard work, walking for exercise
___3 = moderate activity; over 1 hour per week of moderate activity as described above
___4 = vigorous activity; run less than 1 mile per week or spend less than 30 minutes per week in comparable physical activity such as indoor biking, swimming, cycling, rowing, skipping rope, running in place,- or engaging in vigorous aerobic type exercises such as tennis, basketball, or handball
___5 = vigorous activity; run 1-5 miles per week or spend 30-60 minutes per week in comparable physical activity as described above
___6 = vigorous activity; run 6-10 miles per week or spend 1-3 hours per week in comparable physical activity as described above
___7 = vigorous activity; run 11-15 miles per week or spend 4-6 hours per week in comparable physical activity as described above
___8 = vigorous activity; run 16-20 miles per week or spend over 6-7 hours per week in comparable physical activity as described above
___9 = vigorous activity; run 21-25 miles per week or spend over 7-8 hours per week in comparable physical activity as described above
__10 = vigorous activity; run over 25 miles per week or spend over 8 hours per week in comparable physical activity as described above

## Section II

**Fill in the blank**

Graduation year 19_____ Age _____

**Please check the appropriate blank**

Gender
___Male
___Female

Marital Status
____Married
____Single

Your Present Income
____1. Unemployed.
____2. $10,000-20,000
____3. $20,000-30,000
____4. $30,000-40,000
____5. $40,000-50,000
____6. >$50,000

## Section III

**ACTIVITIES: Check each block representing your frequent participation in an activity during the designated periods of your life.**

| | Ages 6-12 | Ages 13-18 | Milligan Inter-collegiate Sports | Milligan Intramurals & Recreational | After Milligan |
|---|---|---|---|---|---|
| **TEAM SPORTS** | | | | | |
| softball/baseball | ☐ | ☐ | ☐ | ☐ | ☐ |
| football | ☐ | ☐ | ☐ | ☐ | ☐ |
| volleyball | ☐ | ☐ | ☐ | ☐ | ☐ |
| basketball | ☐ | ☐ | ☐ | ☐ | ☐ |
| soccer | ☐ | ☐ | ☐ | ☐ | ☐ |
| lacrosse | ☐ | ☐ | ☐ | ☐ | ☐ |
| field hockey | ☐ | ☐ | ☐ | ☐ | ☐ |
| _____other | ☐ | ☐ | ☐ | ☐ | ☐ |
| **INDIVIDUAL SPORTS** | | | | | |
| swimming and diving | ☐ | ☐ | ☐ | ☐ | ☐ |
| alpine/downhill skiing | ☐ | ☐ | ☐ | ☐ | ☐ |
| wrestling | ☐ | ☐ | ☐ | ☐ | ☐ |
| tennis | ☐ | ☐ | ☐ | ☐ | ☐ |
| track and field | ☐ | ☐ | ☐ | ☐ | ☐ |
| gymnastics | ☐ | ☐ | ☐ | ☐ | ☐ |
| badminton | ☐ | ☐ | ☐ | ☐ | ☐ |
| golf | ☐ | ☐ | ☐ | ☐ | ☐ |
| ping pong | ☐ | ☐ | ☐ | ☐ | ☐ |
| racquetball | ☐ | ☐ | ☐ | ☐ | ☐ |
| _____other | ☐ | ☐ | ☐ | ☐ | ☐ |
| **FITNESS ACTIVITIES** | | | | | |
| aerobics | ☐ | ☐ | ☐ | ☐ | ☐ |
| aquarobics | ☐ | ☐ | ☐ | ☐ | ☐ |
| lap swimming | ☐ | ☐ | ☐ | ☐ | ☐ |
| race-walking | ☐ | ☐ | ☐ | ☐ | ☐ |
| jogging | ☐ | ☐ | ☐ | ☐ | ☐ |
| in-line skating | ☐ | ☐ | ☐ | ☐ | ☐ |
| cross country skiing | ☐ | ☐ | ☐ | ☐ | ☐ |
| cross country ski machine | ☐ | ☐ | ☐ | ☐ | ☐ |
| bicycle riding | ☐ | ☐ | ☐ | ☐ | ☐ |
| exercise bike | ☐ | ☐ | ☐ | ☐ | ☐ |
| stepper machine | ☐ | ☐ | ☐ | ☐ | ☐ |
| treadmill | ☐ | ☐ | ☐ | ☐ | ☐ |
| hiking | ☐ | ☐ | ☐ | ☐ | ☐ |
| weight training | ☐ | ☐ | ☐ | ☐ | ☐ |
| _____other | ☐ | ☐ | ☐ | ☐ | ☐ |

**BARRIERS: Check those item(s) that serve(d) as frequent barriers to exercise.**

| | At Milligan | After Milligan |
|---|---|---|
| lack of time | ☐ | ☐ |
| lack of quality equipment | ☐ | ☐ |
| lack of instruction in use of equipment | ☐ | ☐ |
| distance to facilities or equipment | ☐ | ☐ |
| lack of desire | ☐ | ☐ |
| lack of enjoyment | ☐ | ☐ |
| lack of will power | ☐ | ☐ |
| lack of support from peers | ☐ | ☐ |
| high cost | ☐ | ☐ |
| poor instructor | ☐ | ☐ |
| disruptions in routine | ☐ | ☐ |
| lack of social reinforcement | ☐ | ☐ |
| perceived lack of physical competence | ☐ | ☐ |
| lack of quality programming | ☐ | ☐ |
| health problems/injury | ☐ | ☐ |
| inclement weather | ☐ | ☐ |
| other | ☐ | ☐ |

## Section IV

**Circle the appropriate response.**

1. Your evaluation of the lecture portion of HPE 101, Fitness for Life.

Poor Fair Average Good Excellent

2. Your evaluation of the activity (exercise) portion of HPE 101, Fitness for Life.

Poor Fair Average Good Excellent

3. The type of exercise intensity you most often choose at present.

Mild Moderate Vigorous

4. The type of exercise intensity you most often chose while at Milligan

Mild Moderate Vigorous

5. Your perceived level of physical skills or abilities.

Very Poor Poor Average Good Excellent

6. Your perceived level of body fat.

Very Low Low Average High Very High

## Section V

**Please read each statement and circle your best response.**

SD - Strongly Disagree
D - Disagree
N - Neither Agree nor Disagree
A - Agree
AS - Agree Strongly

| | | | | | |
|---|---|---|---|---|---|
| 1. I look forward to physical activity. | SD | D | N | A | AS |
| 2. I would arrange or change my schedule in order to participate in physical activity. | SD | D | N | A | AS |
| 3. I am confident of my abilities in sports, exercise, and other physical abilities. | SD | D | N | A | AS |
| 4. I have been a regular exerciser most of my life. | SD | D | N | A | AS |
| 5. I prefer to exercise with a group or friend. | SD | D | N | A | AS |
| 6. My family strongly supports my exercising. | SD | D | N | A | AS |
| 7. I have a place to exercise and equipment that I can use in or near my home. | SD | D | N | A | AS |
| 8. I have a strong belief that exercise is good for me. | SD | D | N | A | AS |
| 9. I am very knowledgeable about fitness and exercise. | SD | D | N | A | AS |
| 10. Physical activity is drudgery. | SD | D | N | A | AS |
| 11. I do not need to exercise regularly for my own health and fitness. | SD | D | N | A | AS |
| 12. I prefer to exercise by myself. | SD | D | N | A | AS |
| 13. I frequently quit an exercise program within the first 6 months. | SD | D | N | A | AS |
| 14. In comparison to others my age I exercise more. | SD | D | N | A | AS |

| | | | | | |
|---|---|---|---|---|---|
| 15. My physical skills are at a high enough level to complete any exercise program I would choose to undertake. | SD | D | N | A | AS |
| 16. If my friend does not exercise, I will not exercise. | SD | D | N | A | AS |
| 17. I get discouraged easily. | SD | D | N | A | AS |
| 18. Many sports and physical activities are too difficult for me. | SD | D | N | A | AS |
| 19. I like to take on jobs that challenge me. | SD | D | N | A | AS |
| 20. I'm not likely to put myself out if I don't have to. | SD | D | N | A | AS |
| 21. I possess good general physical fitness. | SD | D | N | A | AS |
| 22. I do not feel capable to complete an exercise program. | SD | D | N | A | AS |
| 23.I have friends who enjoy the same kinds of exercise that I do. | SD | D | N | A | AS |
| 24. Doing regular physical activity does little to make me physically more attractive. | SD | D | N | A | AS |
| 25.I exercise even if my exercise workout is not enjoyable. | SD | D | N | A | AS |
| 26. Much of what I know today about health and fitness I learned in Fitness for Life. | SD | D | N | A | AS |
| 28. Physical activity is vitally important to me. | SD | D | N | A | AS |

## Section VI

**Please take a moment and respond to these FINAL items.**

1. What specifically could be done at Milligan to encourage health and fitness habits? These suggestions might be related to programming, curriculum, facilities, equipment, etc.

2. What aspects of the Milligan environment encouraged you toward lifetime habits of health and fitness? (curriculum, faculty, programs, facilities, etc.)

3. If there is anything else you would like to say related to health and wellness, here is your chance.

# APPENDIX B

## TABLES OF ANALYSIS OF VARIANCE OF ACTIVITY LEVELS BASED ON INDEPENDENT VARIABLES

TABLE B-1

ANALYSIS OF VARIANCE OF ACTIVITY LEVELS BY INDEPENDENT VARIABLES

| Source | SS | DF | MS | F | *p* |
|---|---|---|---|---|---|
| Gender | | | | | |
| (Between Groups) | 12.16 | 1 | 12.16 | 9.28 | .0026* |
| (Within Groups) | 268.69 | 205 | 1.31 | | |
| Income | | | | | |
| (Between Groups) | 4.60 | 5 | .92 | .61 | .6040 |
| (Within Groups) | 272.47 | 198 | 1.38 | | |
| Perceived level of skill | | | | | |
| (Between Groups) | 45.67 | 4 | 11.42 | 9.96 | .0000* |
| (Within Groups) | 229.48 | 198 | 1.16 | | |
| Confidence in abilities | | | | | |
| (Between Groups) | 21.90 | 4 | 5.48 | 4/28 | .0024* |
| (Within Groups) | 257.32 | 201 | 1.29 | | |
| Perceived skill level for exercise program | | | | | |
| (Between Groups) | 26.75 | 4 | 6.69 | 5.32 | .0004* |
| (Within Groups) | 252.48 | 201 | 1.26 | | |
| Confidence in sports and physical activities | | | | | |
| (Between Groups) | 30.17 | 4 | 7.54 | 6.09 | .0001* |
| (Within Groups) | 249.57 | 201 | 1.24 | | |

*$p < .05$

Table B-1 (continued)

| Source | SS | DF | MS | F | *p* |
|---|---|---|---|---|---|
| General fitness | | | | | |
| (Between Groups) | 78.36 | 4 | 19.59 | 19.60 | .0000* |
| (Within Groups) | 200.87 | 201 | .1.00 | | |
| Confidence in completing exercise program | | | | | |
| (Between Groups) | 20.82 | 4 | 5.21 | 4.04 | .0036* |
| (Within Groups) | 257.88 | 200 | 1.29 | | |
| Ability to workout even if not enjoyable | | | | | |
| (Between Groups) | 24.70 | 4 | 6.17 | 4.87 | .0009* |
| (Within Groups) | 254.53 | 201 | 1.27 | | |
| Exercise self-efficacy | | | | | |
| (Between Groups) | 75.68 | 22 | 3.43 | 3.09 | .0000* |
| (Within Groups) | 203.55 | 183 | 1.11 | | |
| Positive anticipation of activity | | | | | |
| (Between Groups) | 66.80 | 4 | 16.70 | 15.76 | .0000* |
| (Within Groups) | 211.90 | 200 | 1.06 | | |
| Activity is drudgery | | | | | |
| (Between Groups) | 39.90 | 4 | 9.10 | 8.39 | .0000* |
| (Within Groups) | 235.52 | 198 | 1.19 | | |

*$p < .05$

Table B-1 (Continued

| Source | SS | DF | MS | F | *p* |
|---|---|---|---|---|---|
| Regular exerciser | | | | | |
| (Between Groups) | 52.10 | 4 | 13.02 | 11.53 | .0000* |
| (Within Groups) | 227.13 | 201 | 1.13 | | |
| Continuing an exercise program | | | | | |
| (Between Groups) | 33.81 | 4 | 8.45 | 6.92 | .0000* |
| (Within Groups) | 245.42 | 201 | 1.22 | | |
| Quantity of exercise compared to same age group | | | | | |
| (Between Groups) | 99.52 | 4 | 24.88 | 27.83 | .0000* |
| (Within Groups) | 179.71 | 201 | .89 | | |
| Habit | | | | | |
| (Between Groups) | 98.78 | 12 | 8.23 | 8.80 | .0000* |
| (Within Groups) | 180.45 | 193 | .93 | | |
| Exercise intensity level after Milligan | | | | | |
| (Between Groups) | 76.58 | 2 | 38.29 | 39.43 | .0000* |
| (Within Groups) | 191.29 | 197 | .97 | | |
| Exercise intensity level at Milligan | | | | | |
| (Between Groups) | 50.34 | 2 | 15.17 | 22.03 | .0000* |
| (Within Groups) | 226.20 | 198 | 1.14 | | |

*$p < .05$

Table B-1 (Continued)

| Source | SS | DF | MS | F | *p* |
|---|---|---|---|---|---|
| Youth team sports | | | | | |
| (Between Groups) | 33.95 | 12 | 2.83 | 2.22 | .0121* |
| (Within Groups) | 246.9 | 194 | 1.27 | | |
| Youth individual sports | | | | | |
| (Between Groups) | 15.68 | 13 | 1.20 | .88 | .5771 |
| (Within Groups) | 265.27 | 193 | 1.37 | | |
| Youth fitness activities | | | | | |
| (Between Groups) | 21.69 | 11 | 1,97 | 1.48 | .1400 |
| (Within Groups) | 259.16 | 1.33 | | | |
| Total youth activities | | | | | |
| (Between Groups) | 31.31 | 26 | 1.2 | .86 | .6561 |
| (Within Groups) | 249.00 | 179 | 1.39 | | |
| | 79 | | | | |
| At Milligan team sports | | | | | |
| (Between Groups) | 56.00 | 6 | 9.33 | 8.30 | .0000* |
| (Within Groups) | 224.85 | 200 | 1.12 | | |
| At Milligan individual sports | | | | | |
| (Between Groups) | 11.21 | 6 | 1,87 | 1.38 | .2221. |
| (Within Groups) | 269.64 | 200 | 1.35 | | |

$p < .05$

Table B-1 (Continued)

| Source | SS | DF | MS | F | *p* |
|---|---|---|---|---|---|
| At Milligan fitness activities | | | | | |
| (Between Groups) | 43.73 | 11 | 3.97 | 3.27 | .0004* |
| (Within Groups) | 237.12 | 195 | 1.22 | | |
| At Milligan activity total | | | | | |
| (Between Groups) | 49.55 | 16 | 3.10 | 2.54 | .0014* |
| (Within Groups) | 231.29 | 190 | 1.22 | | |
| Total team sports | | | | | |
| (Between Groups) | 57.35 | 18 | 3.19 | 2.68 | .0005* |
| (Within Groups) | 223.49 | 188 | 1.19 | | |
| Total individual sports | | | | | |
| (Between Groups) | 25.51 | 22 | 1.16 | .8358 | .6783 |
| (Within Groups) | 255.33 | 184 | 1.39 | | |
| Total fitness activities | | | | | |
| (Between Groups) | 52.66 | 21 | 2.51 | 2.03 | .0068* |
| (Within Groups) | 228.19 | 185 | 1.23 | | |
| Total activities | | | | | |
| (Between Groups) | 76.95 | 42 | 1.83 | 1.47 | .0457* |
| (Within Groups) | | | | | |

*$p < .05$

Table B-1 (Continued)

| Source | SS | DF | MS | F | *p* |
|---|---|---|---|---|---|
| Prefer exercise with friend or group | | | | | |
| (Between Groups) | 6.60 | 5 | 1.32 | .997 | .4381 |
| (Within Groups) | 272.63 | 200 | 1.36 | | |
| Family strongly supports exercise | | | | | |
| (Between Groups) | 5.43 | 4 | 1/36 | 1.00 | .4102 |
| (Within Groups) | 273.79 | 201 | 1.36 | | |
| Have friends who enjoy same exercise | | | | | |
| (Between Groups) | 11.12 | 4 | 2.78 | 2.08 | .0842 |
| (Within Groups) | 268.11 | 201 | 1.33 | | |
| Does not need to exercise with a friend | | | | | |
| (Between Groups) | 26.28 | 4 | 6.57 | 5.22 | .0005 |
| (Within Groups) | 252.95 | 201 | 1.26 | | |
| Barrier - lack of quality equipment at Milligan | | | | | |
| (Between Groups) | 17.33 | 1 | 17.33 | 13.50 | .0003* |
| (Within Groups) | 161.89 | 204 | 1.28 | | |
| | 48 | | | | |
| Barriers at Milligan | | | | | |
| (Between Groups) | 19.83 | 13 | 1.52 | 1.13 | .3364 |
| (Within Groups) | 259.39 | 192 | 1.35 | | |

*$p < .05$

Table B-1 (Continued)

| Source | SS | DF | MS | F | *p* |
|---|---|---|---|---|---|
| Barrier lack of willpower after Milligan | | | | | |
| (Between Groups) | 17.23 | 2 | 8.61 | 6.67 | .0016* |
| (Within Groups): | 262.00 | 203 | 1.29 | | |
| Barrier lack of physical competence after Milligan | | | | | |
| (Between Groups) | 14.63 | 2 | 7.32 | 5.61 | .0042* |
| (Within Groups) | 264.59 | 203 | 1.30 | | |
| : | | | | | |
| Barrier lack of enjoyment after Milligan | | | | | |
| (Between Groups) | 10.88 | 1 | 10.88 | 8.27 | .0045* |
| (Within Groups) | 268.35 | 204 | 1.31 | | |
| : | | | | | |
| Barrier lack of social reinforcement after Milligan | | | | | |
| (Between Groups) | 6.65 | 1 | 6.65 | 4.97 | .0268* |
| (Within Groups) | 272.58 | 204 | 1.34 | | |
| : | | | | | |
| Barrier lack of desire after Milligan | | | | | |
| (Between Groups) | 5.76 | 1 | 5/76 | 4/30 | .0394* |
| (Within Groups) | 273.46 | 204 | 1.34 | | |
| : | | | | | |
| Barrier after Milligan | | | | | |
| (Between Groups) | 22.79 | 14 | 1.63 | 1.21 | .2689 |
| (Within Groups) | 256.44 | 191 | 1.34 | | |
| : | | | | | |

*$p < .05$

Table B-1 (Continued)

| Source | SS | DF | MS | F | *p* |
|---|---|---|---|---|---|
| Fitness for Life - activity | | | | | |
| (Between Groups) | 7.09 | 4 | 1.77 | 1.29 | .2766 |
| (Within Groups): | 239.41 | 174 | 1.38 | | |
| Fitness for Life -lecture | | | | | |
| (Between Groups) | 15.25 | 13 | 1.17 | .8454 | .6117 |
| (Within Groups): | 252.48 | 182 | 1.39 | | |
| Health knowledge from Fitness for Life | | | | | |
| (Between Groups) | 12.68 | 5 | 2.54 | 1.89 | .0980 |
| (Within Groups): | 255.05 | 190 | 1.34 | | |
| Fitness for Life | | | | | |
| (Between Groups) | 7.22 | 4 | 1.80 | 1.31 | .2672 |
| (Within Groups) | 239.28 | 174 | 1.37 | | |
| Belief exercise is beneficial | | | | | |
| (Between Groups) | 36.81 | 3 | 12.27 | 10.22 | .0000* |
| (Within Groups) | 242.42 | 202 | 1.20 | | |
| Exercise not necessary for fitness | | | | | |
| (Between Groups) | 18.12 | 4 | 4.53 | 3.49 | .0089* |
| (Within Groups) | 261.11 | 201 | 1.30 | | |

*$p < .05$

Table B-1 (Continued)

| Source | SS | DF | MS | F | *p* |
|---|---|---|---|---|---|
| Exercise not related to attractiveness | | | | | |
| (Between Groups) | 20.78 | 4 | 5.19 | 4.04 | .0036* |
| (Within Groups): | 258.45 | 201 | 1.29 | | |
| Knowledge level of fitness | | | | | |
| (Between Groups) | 15.20 | 4 | 3.80 | 2.90 | .0233* |
| (Within Groups): | 264.29 | 201 | 1.31 | | |
| Activity vitally important | | | | | |
| (Between Groups) | 56.37 | 3 | 18.79 | 17.03 | .0000* |
| (Within Groups): | 222.85 | 202 | 1.10 | | |

Table B-2

TABLE OF ANALYSIS OF VARIANCE OF SELF EFFICACY BASED ON INDEPENDENT VARIABLES

| Source | SS | DF | MS | F | *p* |
|---|---|---|---|---|---|
| Preference exercise with family or group | | | | | |
| (Between Groups) | 78.62 | 5 | 15.72 | .71 | .6179 |
| (Within Groups) | 4529.71 | 204 | 22.02 | | |
| Family supports exercise | | | | | |
| (Between Groups) | 309.63 | 4 | 77.26 | 3.68 | .0064* |
| (Within Groups) | .4299.26 | 205 | 20.97 | | |
| Friends enjoy same exercise | | | | | |
| (Between Groups) | 361.21 | 4 | 90.30 | 4.36 | .0021* |
| (Within Groups) | 4247.12 | 205 | 20.72 | | |
| Does not need to exercise with friend | | | | | |
| (Between Groups) | 582.78 | 4 | 145.69 | 7.42 | .0000* |
| (Within Groups) | 4025.55 | 205 | 19.64 | | |

* $p < .05$

# APPENDIX C

## SURVEY COVER LETTERS AND CURRICULUM VITA

January 7, 1997

Annie Alumni
101 Milligan Hwy.
Johnson City, TN 37682

Dear Annie,

I am working to complete a doctorate at ETSU and desperately need your assistance (surprise, this is NOT a request for money). I have chosen as my dissertation topic, Collegiate Activities that Influence Adult Physical Fitness Habits, in hopes of examining the association of various adult physical activity levels with participation in specific college activities, preferences for types of exercise, social influences, influences of curriculum, and environmental barriers. The purpose of the data analysis will be to determine what college activities are the best predictors of physical activity and to determine what tangible changes Milligan College could make to provide more positive encouragement and opportunity for exercise habits that transfer into later adulthood.

As a recent graduate you were part of the curriculum and activities nearest those presently offered at Milligan, and your recall of activities should be better than that of earlier graduates. For those reasons I would like you to fill out the enclosed Milligan Alumni Activity Questionnaire as your response is vitally important to this research.

Your response will be anonymous. Each questionnaire and return envelop are coded with an identification (ID) number that corresponds with a master list of graduates. When you return your questionnaire, it will be checked in by ID envelop and then separated from the envelop. The questionnaire will then be placed randomly in a box and will not be viewed until it has been separated from the master list of graduates so that no comparisons of ID numbers and names will be possible.

Please take a few minutes (average is nine minutes) to respond to this questionnaire and then return it in the stamped, self-addressed envelop by February 1, 1997. A summary of the results of this research will appear in a later article in The Millagenda.

Thank you for any help you can offer and I wish you a happy and blessed 1997!

Sincerely,

Linda King

PS My 1997 will be happier and more blessed if you return this questionnaire.

March 3, 1997

Alice Adams
304 Davis Street
Sebastian, FL 32958

Dear Alice,

I imagine you are busy as I am these days and filling out a Milligan Alumni Activity Survey might not seem like the most exciting use of your time. In an effort to make this activity more enjoyable I am providing you with a list of possible companion activities that might make this request more palpable.

Things to do while you're filling out Coach King's questionnaire:

1. watch an NCAA basketball game
2. drive to Angola, IN and watch Milligan's women's basketball team compete in the NAIA national tournament.
3. fill a water balloon in honor of the good ole days of Pardee and freshman humanities - please, no wet questionnaires
4. write the top 10 reasons why you should be chosen president as Dr. Leggett retires and return it with your questionnaire
5. watch those pounds drop off (you will burn approximately 23 calories while filling out this questionnaire, more if you turn the pages vigorously)

So, surely one of those options tantalized you enough to allow you to take a few minutes *right no* and fill out this questionnaire and return it to me *today*. I hope to compile and analyze the data beginning spring break, which is less than two weeks away, so your haste and attention would be greatly appreciated (I'm begging now).

If you have questions, call me at home at (423) 928-6690 late in the evening. Thank you for taking the time to read this letter and fill out this questionnaire.

Enjoy the Springtime!! (while you out a questionnaire).

Sincerely,

Linda King

# CURRICULUM VITA

Linda Lee King
157 Joy Dr.
Johnson City, TN 37601
Phone: (615) 928-6690 (home)
(615) 461-8725 (office)
Fax: (615) 461-8738

Born: April 17, 1949
Children: Kelly (b.1/2/79),
Scott (b. 6/28/81)

## EDUCATIONAL BACKGROUND

| | |
|---|---|
| 1967 | Allegheny College, Meadeville, Pennsylvania |
| 1968 | Lake Erie College, Painesville, Ohio |
| 1969-1970 | University of Cincinnati, Cincinnati, Ohio |
| 1969-1970 | Cincinnati Bible College, Cincinnati, Ohio |
| 1968-1971 | Wittenberg University. Springfield, Ohio (B.A.) |
| 1971-1972 | Xavier University, Cincinnati, Ohio (M.Ed.) |
| 1988 | American College of Sports Medicine (FloridaUniversity) |
| 1997 | East Tennessee State University, Johnson City Tennessee (Ed.D.) |

## TEACHING EXPERIENCE

Assistant Professor: Cincinnati Bible College, 1971-1978
physical education activities classes, learning disabilities, education of the exceptional, Christian camping, public speaking, and principles of recreation

Assistant Professor: Milligan College, 1983-present.
motor learning, measurement and evaluation, history and philosophy of physical education, organization and administration of physical education, folk dance, lifeguarding, CPR and First Aid, and fitness for life.

## ADMINISTRATIVE EXPERIENCE

| | |
|---|---|
| 1971-1978 | Director of intramurals, Cincinnati Bible College |
| 1979-1983 | Director of children's ed, First Church of Christ, Painesville, Ohio |
| 1983-1995 | Director of intramurals, Milligan College |
| 1985-1995 | Volleyball camp director, Milligan College |
| 1991-1994 | District 24 volleyball chair, State of Tennessee |
| 1993-1995 | National volleyball rater |

## COACHING EXPERIENCE

| | | |
|---|---|---|
| Volleyball, basketball, and softball | Cincinnati Bible College | 1971-1978 |
| Softball | Milligan College | 1983-1988 |
| Volleyball | Milligan College | 1983-1995 |
| Tri Cities volleyball | Kingsport, TN | 1995 |

## HONORS

| | |
|---|---|
| District 5 Coach of the Year (NCCAA) | 1987, 1988, 1989 |
| Tennessee Valley Athletic Conference Coach of the Year | 1989 |
| District 24 Coach of the Year (NAIA) | 1989, 1990 |
| Tachikara Victory Club Award, 300 Career Victories | 1995 |
| Wittenberg University Hall of Fame | 1995 |

## CERTIFICATIONS

| | |
|---|---|
| State volleyball official | 1971-1983, 1994-1995 |
| National basketball official | 1971-1983 |
| State field hockey official | 1971-1983 |
| American College of Sports Medicine: Fitness Instructor | 1988 |
| National dance exercise instructors training association: aerobics instructor | 1991 |
| Coaching accreditation program , United States Volleyball Association: Level I | 1989 |
| Coaching Accreditation Program, United States Volleyball Association: Level II | 1991 |

## PROFESSIONAL AFFILIATIONS

American Alliance of Health, Physical Education, Recreation, and Dance
Tennessee Association of Health, Physical Education, Recreation, and Dance
American Volleyball Coaches Association
National Association of Intercollegiate Athletics
American College of Sports Medicine
National Intramural and Recreational Sport Association

## PUBLICATIONS

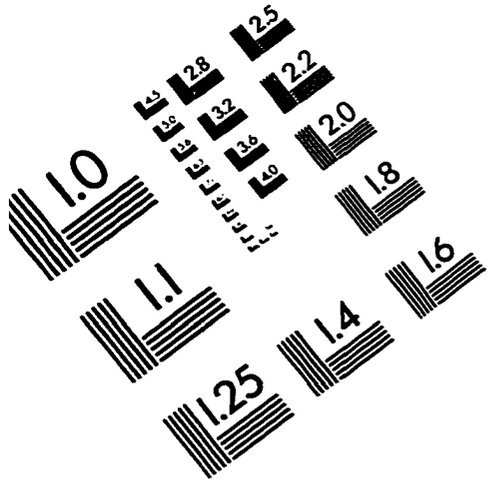
King, L. L., (1990). Learning differently. In J. Pierson, & R.E. Korth (Eds.), Reaching out to special people. (pp. 112-116) Cincinnati, OH: Standard Publishing: 112-116.

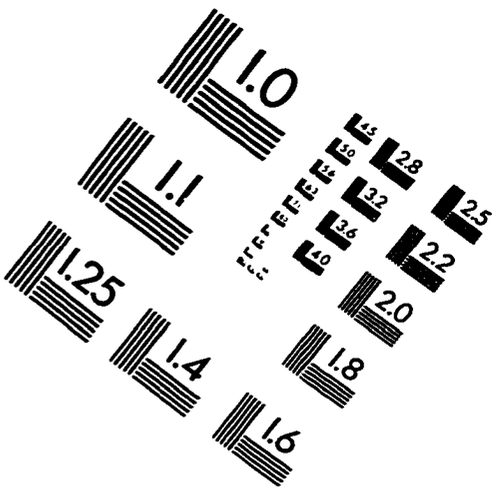
King, L.L., (1974) Children who learn differently. In M. Taylor (Ed.) Lookout. Cincinnati, OH: Standard Publishing.

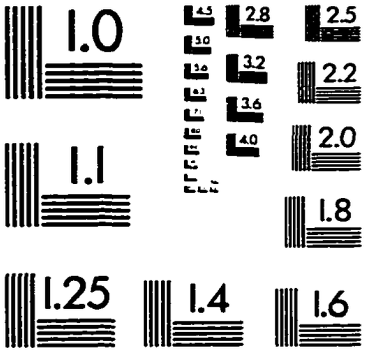
## CONFERENCE, LECTURE, AND WORKSHOP PRESENTATIONS

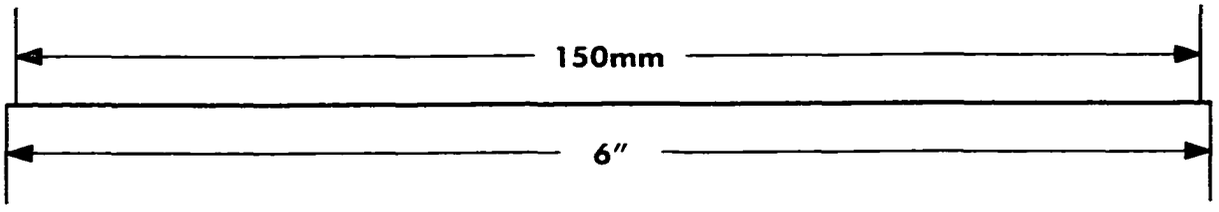
"Two Kinds of Insurance." National Association of Insurance Women. June 9, 1974.
"Majoring in Minors - Teaching Children." Round Lake Christian Assembly. May, 1975.
"Feminine Gender." Indiana State Teen Convention. November, 1978.
"Values Conflicts." Blue Rock Christian Assembly Women's Retreat. June, 1978
"Stress." Milligan College Faculty Retreat. August 25, 1986.
"Blessed." Emmanuel School of Religion Convocation. February 7, 1986.
"The Christian and Wellness." Grandview Christian Church. February 16, 1988.
"Getting Fit for the Kingdom." Singles Conference, Portland, Oregon. 1990
"How's Your Heart?" Singles Conference, Portland, Oregon. 1990
"Minimum Daily Requirement." Emmanuel School of Religion. 1993.
"Jesus Grew in Stature." Matriculation Convocation. January, 1995
"Divorce, through the valley and beyond" North American Christian Convention
Kansas City. July, 1997
"Fit for the Kingdom." Women's Retreat, Geneva, Ohio. 1997.

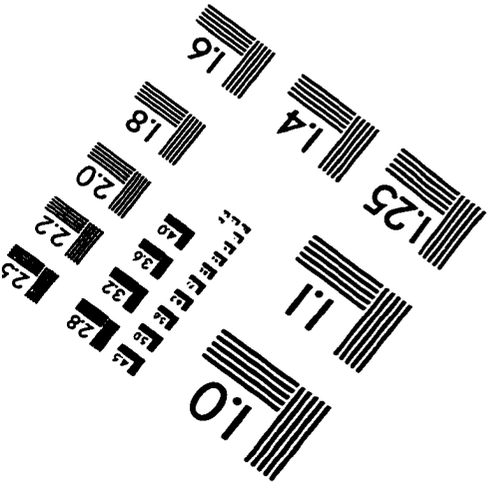
# IMAGE EVALUATION
# TEST TARGET (QA-3)

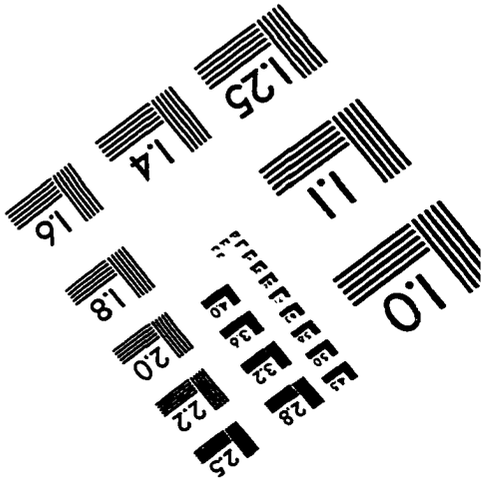
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